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GENERAL BOARD OF HEALTH.

PAPERS RELATING TO THE SANITARY STATE OF THE PEOPLE OF ENGLAND:

BEING

The Results of an Inquiry into the different Proportions of Death produced by certain Diseases in different Districts in England; communicated to the General Board of Health by EDWARD HEADLAM GREENHOW, *M.D., Licentiate of the Royal College of Physicians, Lecturer on Public Health at St. Thomas's Hospital, and Physician to the Western General Dispensary;*

WITH

An Introductory Report, by the MEDICAL OFFICER OF THE BOARD, *on the Preventability of certain Kinds of Premature Death.*

Presented to both Houses of Parliament by Command of Her Majesty.

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INTRODUCTORY REPORT BY THE MEDICAL OFFICER OF THE BOARD.

General Board of Health ;
June, 1858.

SIR,

I HAVE the honour of laying before you a paper which exposes in a very remarkable manner the present wasteful expenditure of human life in England.

Presentation of annexed paper.

It is the work of Dr. Greenhow, Lecturer on Public Health at St. Thomas's Hospital ; who, having recently found it requisite for his own purposes, as a teacher of sanitary science, to analyze more minutely than had hitherto been done, the distribution of diseases among different parts of the community, has done me the favour of acquainting me with the results of his inquiry. And as these results appear to me of singular public interest with reference to sanitary administration, I have begged Dr. Greenhow to let me submit to you the paper in which he has embodied them.

It cannot be necessary that, with the paper here to speak for itself, I should attempt to offer you any complete analysis of its contents. But there are some of its conclusions which I would ask leave particularly to mention ; partly because of their own very great interest ; and partly because, in the new light which they afford, the sanitary state of the people of England almost imperatively claims to be reconsidered as a whole.

On this opportunity, therefore, I shall venture to submit to you my opinions as to the degree in which premature death can practically be prevented in England ; and I shall refer to that most valuable evidence which Dr. Greenhow's paper presents, as illustrating how very much remains to be done in great part of England before the limits of that practical preventability will be even distantly approached.

IT has now for some time been taught in the reports of the Registrar-General, that, of the entire annual mortality of England, at least a fourth part is of artificial production.

Alleged excess of deaths in England.

England is divided into 628 registration districts. Of these there are sixty-four (containing a population of about a million inhabitants) wherein the annual death-rate per 100,000 ranges from 1,500 to 1,700. But the average death-rate of England is about 2,266. Nearly nine-tenths of the registration districts of England show death-rates which are in excess of 1,700, and which, in some notorious cases, run up to 3,100, 3,300, and 3,600.*

No one pretends that people live too long in the 64 districts first referred to. That life is artificially shortened in the other 564 districts, seems the necessary alternative.

At this point the general statistical argument requires to be re-inforced by the more detailed results of two other inquiries:—first, what does medical experience say as to the dependence on removable causes—in other words, as to the preventability of certain diseases which contribute largely to the total mortality of England? and, secondly, what difference is there in the prevalence of these diseases in different districts of England?

It is the second of these questions which, to a great extent, Dr. Greenhow has answered. The value of his answer consists in its applicability to the purposes of local sanitary education and local sanitary improvement; an applicability which cannot be otherwise tested and defined than by taking the two questions together, and considering the different local pressures of different diseases in connexion with the degree to which each disease admits of prevention.

CAUSES OF DEATH.

First, then, as to the preventability of certain diseases:—

Natural death.

Death by old age is, physiologically speaking, the only normal death of man. And its essence is this:—that organs necessary to the mere vegetative life of the body have naturally undergone such modifications of texture that they can no longer fulfil their former ministerial uses.† Having first ripened to their several prefigured patterns, and having performed for a while their several appointed functions, they become incapable of continuing longer without decline. Thus it is that death, unaccelerated by exterior influences, creeps at last on all; and the textural changes which mark its gradual progress are probably, in their kind, common to every living creature. In the human subject it is by degenerative changes in the heart and arteries

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* In the Registrar-General's last Quarterly Return (No. 36) it is well argued that, to account for this difference of effect, there must exist some difference of cause; and "whether the cause admit or do not admit of removal, the fact is incontestable and must not be lost sight of, that the excess of deaths in England and Wales over those from causes which exist in 64 districts was 91,856 in the year 1857; for 420,019 persons died in that year [though its death-rate was below the average], and about 328,163 persons would have died had the mortality not exceeded the standard of 17 deaths in 1,000 living."

It deserves notice that the mortality which most peculiarly may be called premature—the mortality of young children—shows a still greater range of difference than the mortality of all ages. The death-rates of children in the first year of life were observed during the years 1838–44, to range per 1,000, in the *counties* of England from 118 in Westmorland to 237 in Lancashire; and in the *districts* of England from 77 in Glendale, Bellingham, and Haltwhistle to 296 in Aston-under-Lyne and Nottingham.

† "Causa autem periodi ea est; quod spiritus, instar flammæ lenis, perpetuo prædatorius, et cum hoc conspirans aër externus . . . tandem officinam corporis et machinas et organa perdat, et inhabilia reddat ad munus reparationis."—*Bacon, Hist. Vitæ et Mortis.*

Natural death.

that natural death most frequently occurs. And to undergo these changes in old age is as natural a part of human life as to have attained in succession youth and manhood. But the period when they tend to consummate themselves in death is not precisely defined. There are personal differences of longevity. Death, virtually by old age, comes to some men even before their sixtieth year. To most men it comes much later. A few complete their fifth vicenniad, and even carry far into it their noblest mental endowments. And apart, so far as is known, from any immediate dependence on exterior circumstances, these differences tend to repeat themselves in particular families. They are differences of stock.* But they are not operative to any great extent. And it cannot be far from the truth to assume that, if there were no artificial interference with the duration of life, death by natural decay would, in this country, under its present circumstances, usually happen at about 80 years of age.†

Premature death.

Now little more than a tenth part of the deaths of England happen at 75 years and upwards. And thus, physiologically speaking, one may say that at least nine-tenths of the entire mortality occurs more or less prematurely.

But this physiological statement must be guarded from misapplication. It would require more knowledge than is yet possessed by the professors of medicine to say that all *premature* death is, even in theory, *preventable* death. And while the science of medicine is hitherto unable to advance this proposition, even as ideally true, still less can any reasonable person pretend that, practically speaking, it so much as approximates to truth.

UNAVOIDABLE CAUSES OF PREMATURE DEATH.

The daily experience of every man is sufficient to tell him that there always have operated, and always must operate, very many causes of premature death. Most properly he may seek to reduce these causes to their least possible degree of destructiveness. Most properly he may watch against too indolent an acquiescence in any existing evil. But he cannot refuse to recognize that a certain proportion of what science classifies as premature death is, to all practical intents and purposes, not preventable.

Congenital and hereditary influence.

For, first, the certainty of premature death—a certainty quite irrespective of the immediate influence of exterior cirumstances —is a *condition under which many are born.* Children come into the world, sometimes with malformations, which render healthy life impossible; sometimes with inherited disease or inherited morbid predisposition; sometimes with various ill-defined weaknesses of vitality, which render them unable to struggle onward, even for a single year, or dispose them more readily to sink under the ordinary trials of infancy. One family has become liable to gout and rheumatism; another to tubercular diseases; another to epilepsy and mania; another to this or that other form of visceral or humoral disease: and children born of these stocks have not the average expectation of healthy life. A certain share of every existing generation has in it from these sources the seeds of premature death. Such seeds may or may not be developed. In respect of many of the cases referred to, medicine has hitherto but imperfectly learnt the art of prevention. In respect of others (and fortunately this applies to the most fatal of the number) exterior circumstances can be shown to exert immense influence, certainly over the development of individual predisposition, and probably over the further propagation of that hereditary fault.

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* Lord Bacon (loc cit.) noticed this fact, but noticed it with a qualification :—" illud vero experientia docet esse quasdam stirpes *ad tempus* longævas, ut longævitas sit, quemadmodum morbi, res hæreditaria *in aliquibus periodis*." The meaning of the qualification, expressed in the words which are italicised, is of course obvious. A long-lived type of man can be perpetuated only by the same sort of care (impossible, of course, on any large scale for the human subject) as is applied to perpetuate particular valuable qualities of farm stock ; and similarly the short-lived type could only be changed by cross breeding.

† In the Faroe islands, with a population of about 8,000, it appears that the period for death by old age is from the 80th to the 90th year ; for, according to Dr. Panum, *many more deaths happen within that decennium of age than within any other decennium after the completion of the first year of life.*—Virchow's Archiv. I. 493.

Unquestionably, however, deaths referred to under the present head are to a certain extent not preventable. And in order to determine whether the limits at which they become preventable have in any particular case been exceeded, the following considerations furnish, I think, the safest argument for guidance:—(1) that the influence alleged to be non-preventable in the causation of these deaths is the personal or family predisposition; (2) that in any one country of moderate extent and mixed race, with a population exercising from part to part the freest intercourse and intermarriage and intermigration, this influence would tend to be uniformly diffused; and (3) that, therefore, no natural reason can be conceived for its being in any one district of such a country much more powerful than in another district. So far, then, as personal predisposition accounts for the diseases in question, they would hardly be expected to vary much in their proportionate fatality in different districts of England. And any considerable exception to their uniform diffusion would suggest a very strong suspicion, that in the districts where they excessively prevail certain exciting causes must be specially and preventably in operation.

Contagions of small-pox, hooping-cough, measles and scarlatina.

A further—practically speaking, unavoidable—cause of premature death in every civilized country is the risk of its *current contagions.* In Europe there are certain infectious complaints of which, once in life, nearly all persons are susceptible. The contagions of these diseases are never long absent from large communities; and a child during its first few years of life is almost of necessity exposed to them. Hence it is that, in European experience. the diseases in question—small-pox, hooping-cough, measles, and scarlatina—are so well known as diseases of childhood. To those who choose to avail themselves of Jenner's discovery, small-pox—the most fatal malady of this class—needs no longer be counted as a danger; but liability to the other infections is a more or less considerable risk which science hitherto cannot avert. Hooping-cough, measles, and scarlatina are, therefore, to a certain extent inevitable causes of premature death. The severity with which any one of these diseases attacks an individual patient depends on his individual constitution; and often we are able to observe that corresponding differences of constitution (the sources of which are quite unknown to us) belong to several members of the same family. But, given a certain severity of attack, the fatality of these diseases is greatly and evidently proportionate to exterior conditions. And the poor suffer from them immensely more than the rich, partly from possessing less ample means of treatment, but mainly because of the impure atmosphere which commonly surrounds the patient in his overcrowded and unventilated dwelling.

In respect, then, of these diseases (as of those previously spoken of) it may fairly be supposed that their natural tendency is to prevail with equal severity or equal mildness in all districts of England; and any disproportionate fatality of these diseases in certain districts, as compared with their habitual fatality in other districts, is a fact which requires to be accounted for by the operation of local causes.

Privation.

Practically, too, it must be reckoned that, even with the high civilisation of this country, and with its unequalled system of poor-law relief, *privation* still exists as a cause of premature death. Among the surgical cases treated at hospitals and dispensaries, diseases from insufficient nourishment form a very considerable part. Children especially suffer from this cause; and many of their so-called scrofulous ailments are in fact mere starvation-disorders, which a few weeks of better feeding can cure. And, besides the direct stint of food, and that indirect stint which consists in the use of damaged and adulterated provisions, there are other kinds of privation practically inseparable from poverty. It must have scanty house-room; and this—at least till the means of ventilating poor dwellings are thoroughly popularised—is an increased liability to disease. It must have scanty clothing and scanty fuel, and with little other protection than habit must encounter inclemencies of weather. It must have a weight of care in its daily struggle for subsistence; it must have little of the variety and pleasurable excitement which are good for mind and body. Few tasks can be more difficult than to estimate the diffusion of poverty, as distinguished from pauperism, in different parts of England; and I have no means of determining whether poverty, in this sense, be one of the local conditions to which any preventable disease at all closely proportions itself. But, as regards pauperism, such certainly is not the case; a glance at Dr. Greenhow's table is sufficient to show that districts with the highest, and districts with the lowest, proportion of pauper-population do not stand opposedly to one another as regards general death-rate, or as regards the death-rates of particular diseases.

Accidental injuries.

Accidental injuries cannot be excluded from the busy life of a large community. Wounds, fractures and contusions, suffocation and drowning, must occasionally everywhere be causes of premature death. And personal carelessness, which contributes largely to produce these casualties, will also bear fruit in a certain number of other premature deaths—especially of deaths of young children by burns and scalds.

Violence, vice, and intemperance.

Criminal violence, too, will cut short some lives. And *vice* and *intemperance* will receive some of their retribution in the form of untimely death.

Extent to which premature death is unavoidable.

Congenital malformations and weaknesses, in their primary or in their secondary influence; hereditary dispositions to chronic and paroxymal disease of one kind and another; the infectious disorders of infancy and childhood; accidental and criminal injuries; privation in its various forms; intemperance and profligacy;—these are causes of premature death, which, it seems to me, must be accepted as, *to a certain extent*, inevitable. To a still further extent they must be accepted as only mitigable by degrees. And up to the extent of their inevitability, the death-rate of a population must rise beyond that which would prevail (1250) if all men lived to their full term of fourscore years.

But what is the extent to which they are inevitable? Experience seems to have answered this question; not perfectly indeed; but with an approximation which, if wrong, is wrong adversely to exaggeration. There are populations which have habitual death-rates of 1500, 1600, and 1700. A million of the inhabitants of England are living on those terms. In 64 registration districts scattered about the land, life is at that advantage.

Are those parts of England exempt, or comparatively exempt, from the morbid influences just recapitulated? There is no shadow of reason for believing that such is the case. They suffer from all the influences in question to the extent to which those influences may fairly be considered inevitable. Deaths thus arising occur even too abundantly in the healthiest districts of England. They are included in the margin of 250, 350, and 450, which, in respect of such districts, raises the theoretical death-rate of 1250 to 1500, 1600 and 1700, respectively.

And at this point, as seems to me, the line of demarcation may reasonably and practically be drawn. If it appears (as it presently will appear) that the inevitable influences in question are in some districts of England greatly more fatal than in others, there will be strong primâ facie grounds for believing that the *local excesses of fatality are due to local circumstances of aggravation;* that *these aggravating local circumstances are such as it is fully possible to counteract;* and that *of the total mortality ascribed to these influences in England a very large share is preventable.*

This conclusion rises in importance in proportion as the diseases to which it relates are more and more frequent. It will presently be applied to those which of all are most fatal to our population; namely, first, to tubercular and other diseases of the lung; and, secondly, to the more special disorders of childhood.

PREMATURE DEATH BY REMOVABLE CAUSES.

But a large share of the premature mortality of England depends on diseases respecting which it cannot be conceded that they (like those last discussed) are, to a certain extent, inevitable. On the contrary, *thousands of deaths annually result from diseases which are, in the most absolute sense, preventable;* diseases, which either will not arise, or will not spread, in communities which follow certain well-known sanitary laws. For, first, there are certain diseases of which it is hardly a metaphor to say, that they consist in the extension of a putrefactive process from matters outside the body to matters inside the body;* diseases, of which the very essence is filth; diseases, which have no local habitation except where putrefiable air or putrefiable water furnishes means for their rise or propagation; diseases, against which there may be found a complete security in the cultivation of public and private cleanliness.† Yet some tens of thousands of deaths annually arise in England from these diseases. And again, there are diseases of other kinds, which annually kill some thousands more of our population, though the appointed preventives are so definite and so accessible that scarcely a death from such causes ought to occur in any civilised country.

To these diseases, so entirely preventable, and to the preventable proportion of those other diseases, is referred, by the allegation which I first quoted, at least a quarter of the mortality of England. And I beg now to bring under your notice some details in reference to both those classes of disease; as to their pressure in England generally; as to the distribution of that pressure in different parts of England; and as to the experience which has been obtained in the means of preventing their rise or reducing their fatality.

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* This, in a certain sense, holds good of all the true zymosial diseases. And the tendency of these diseases to effect *surfaces of elimination* in the body has, with other facts in their pathology, led to a strong suspicion that the chemical sphere of their activity within the infected organism lies in *specific effete constituents* which are either actually undergoing decay and tending to be discharged at excretory surfaces, or are for some reason or other lingering indolently within the body after their period of usefulness. The liability of particular tissues to particular zymotic processes probably depends on their more or less saturation with such refuse-constituents. Every true *contagium* is apparently some form of animal matter in process of transformation. And what is essential to render any such *contagium* capable of starting a given zymotic process in new patients probably is, that it shall have originated in decay or decomposition of the same bodily constituents as are to be affected in the new patients. The relations of cholera and typhoid fever to putrefying excrement is probably in this sense an essential relation. And the affection of the intestinal mucous membrane in these diseases may thus most emphatically be said to represent the extension of a putrefactive process from refuse-matters without the body to refuse-matters within it. The limits of a note will not allow me here to treat this very important subject otherwise than in a few words. I therefore venture to refer to other writings in which I have endeavoured to contribute to a more precise knowledge of it. See Lectures on General Pathology, 1850, Nos. xi., xii.; and Fifth Annual Report on the Sanitary State of the City of London, 1853, pp. 233–7; also comp. Report of Committee for Scientific Inquiries in relation to the Cholera Epidemic of 1853–4, p. 48.

† "No city, so far as science may be trusted, can deserve immunity from epidemic disease, except by making absolute cleanliness the first law of its existence;—such cleanliness, I mean, as consists in the perfect adaptation of drainage, water-supply, scavenage, and ventilation, to the purposes they should respectively fulfil; such cleanliness as consists in carrying away by these means, inoffensively, all refuse materials of life—gaseous, solid, or fluid—from the person, the house, the factory, or the thoroughfare, so soon as possible after their formation, and with as near an approach as their several natures allow to one continuous current of removal."—*Reports on City of London*, p. 261.

DIARRHŒAL DISEASES.

1. *Cholera, diarrhœa* and *dysentery* have, during the nine years 1848–56, been fatal to 237,498 persons. If this number of deaths had been equally divided, the annual number would have been 26,388; but the distribution has been unequal. In the two years 1849 and 1854 there were 116,246 deaths; in the two years 1850 and 1855 there were but 29,425, or little more than a fourth part of the former amount. This inequality depends on the present tendency of diarrhœal diseases to prevail in certain years epidemically. A large proportion of the excess of deaths in 1849 and 1854 occurred during a few summer weeks, when the epidemic influence was at its height, and when it occasioned in various parts of the country a very alarming mortality.

Diarrhœal diseases, for two reasons, claim particular attention. In the first place, they are increasing in this country. During the years 1838–42 the deaths occasioned by them were only 13 per 1,000 of the deaths from all causes; during the years 1847–55 their proportion was five times as great. And, in the second place, their epidemic aggravations are sometimes of appalling severity. These things are almost forgotten when they are past; but probably, since the days of the great plague, death has never so scared an English population as in the cholera-epidemic of Newcastle in 1853, and in the Golden Square outbreak in 1854.

Dr. Greenhow's paper shows that these diseases have prevailed in different parts of the country with an astounding inequality. The average annual death-rate by cholera has ranged, from nothing and nearly nothing in some districts, to 357 and 365 and 403 in others. If cholera alone had shown this enormous range of difference, it might properly be questioned whether the history of two epidemics (for the figures are of course mainly derived from the death-lists of 1848-9 and 1853–4) is enough to justify generalisations in reference to the local affinities of a disease apparently so erratic and fitful in its attacks. Accidental influences might have counted for much in this restricted experience; and it might be expected that our next epidemic visitation would do something towards equalising the death-rates. No doubt this deserves consideration; most of all in those places which have hitherto escaped cholera apparently by no merits of their own. But cholera has not been alone in showing this great range. Local differences of death-rate scarcely less wide have been shown by those diarrhœal diseases which are always present among the population. Ordinary diarrhœa and dysentery have ranged in their joint average annual death-rate from under 10 in several districts, to 303 and 305 and 345 in others. Or if all diarrhœal diseases, epidemic and non-epidemic, be taken together (as Dr. Greenhow has taken them) under the single heading of "alvine flux," the average annual death-rate by this class of disease has ranged in different districts, from 4, 8, 10, 14 and 17 in some, to 463, 493, 519, 568 and 663 in others.

DIARRHŒAL DISEASES.

It may be imagined that the lowest of these death-rates occurs under circumstances of exceptional healthiness which cannot generally be realized. So, instead of taking it for comparison (though I do not admit the objection), I will take *ten times its amount* as my standard. Let the importance of the subject be estimated from one simple statement:—If the diarrhœal death-rate of England generally were even *only ten times* the minimum diarrhœal death-rate, there would be an annual saving in England of nearly 20,000 lives.

Nothing in medicine is more certain than the general meaning of high diarrhœal death-rates. The mucous membrane of the intestinal canal is the excreting surface to which nature directs all the accidental putridities which enter us. Whether they have been breathed, or drunk, or eaten, or sucked up into the blood from the surfaces of foul sores, or directly injected into blood-vessels by the physiological experimenter, there it is that they settle and act. As wine " gets into the head," so these agents get into the bowels.* There, as their universal result, they tend to produce diarrhœa;—simple diarrhœa, in the absence of specific infections; specific diarrhœa, when the ferments of cholera and typhoid fever are in operation. And any such distribution of diarrhœal disease as has just been noticed warrants a presumption—indeed, so far as I know, a practical certainty—that, *in the districts which suffer the high diarrhœal death-rates, the population either breathes or drinks a large amount of putrefying animal refuse.*

A certain quantity of diarrhœa depends, no doubt, on other causes than putrefactive pollution of the system. Phthisis not rarely proves fatal by its effects on the intestinal canal; and probably a few of these deaths are registered under the name of the secondary disease. Temporary faults of diet very often occasion diarrhœa, though not often fatal diarrhœa. Habitually improper food (especially as regards infants and very young children) and various other influences contribute to the total of diarrhœal deaths. But these various causes operate evenly, or almost evenly, throughout the country. And that their aggregate results are inconsiderable, may be inferred from the minimum figures quoted above. The fullest allowance for those causes cannot sensibly affect the general conclusion which I have stated.

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* In some cases of putrid infection, perhaps most in those which are of slowest action, the tonsils and mucous membrane of the pharynx seem particularly to suffer.

DIARRHŒAL DISEASES.

Cholera.

That conclusion might be supported by almost innumerable instances, both in reference to the occasional epidemic prevalence of cholera, and in reference to the habitual endemic prevalence of diarrhœa and dysentery. To the latter point I shall hereafter refer again in speaking of the death-rates of young children, who are probably the chief sufferers from endemic disorder of the bowels. And in reference to the epidemic disease, I trouble you with only two illustrations.

The first relates to the exemption of Tynemouth, in 1853, from an epidemic which prevailed in its neighbourhood. Newcastle and Gateshead suffered on that occasion the most terrible outbreak of cholera yet experienced in England, and lost within a few weeks nearly 2000 of their population. In the borough of Tynemouth, only eight miles below Newcastle, and connected with it by railway as well as by river, there occurred during that epidemic period only four fatal indigenous cases. This escape was not due to an entire non-participation in the epidemic influence; for diarrhœa was generally prevalent in Tynemouth while cholera was in Newcastle. Nor did it depend on the absence of opportunities for contagion; for many thousand persons from Newcastle and Gateshead fled to Tynemouth, and many continued to pass daily between the towns during the whole time of the visitation. The remarkable immunity of Tynemouth is the more remarkable from its contrast with the heavy mortality experienced during the epidemic of 1848–9, when the deaths in the parish from cholera and diarrhœa amounted to 463.*

The great difference between these results seems to have been entirely due to sanitary improvements effected in Tynemouth during the interval between the two visitations. Dr. Greenhow (who at that time was chairman of the Local Board, and took an active part in promoting its sanitary measures) has written the following account† of the course which was adopted:—

" The Public Health Act was applied to the borough of Tynemouth, on the petition of the Town Council, in the summer of 1851. The provisions of the Act, relative to the registration and regulation of common lodging-houses and slaughter-houses and the construction of new streets and houses, were immediately put in force. Care was taken to prevent the erection of houses without proper conveniences and provision for ventilation ; no ash pits were allowed to be made against the main walls of dwelling-houses or without proper doors and covers ; wherever sewers existed, drains from the houses were insisted on ; and all persons laying out new streets were compelled to have back entrances to the houses, and to provide for the construction of drains from the backs of the houses, instead of carrying them underneath the basement story, as was previously usual.

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* The contingent expenses for the maintenance of widows and orphans whose claims arose out of that four months' visitation, appear to have amounted within the next four years to 7,500*l.* The cost (direct and indirect) of the epidemic at Newcastle and Gateshead, was estimated at about 40,000*l.* over and above the large losses sustained from the temporary stoppage of trade.

† Cholera in Tynemouth in 1831–32, 1848–49, and 1853. By E. Headlam Greenhow, M.D., read before the Epidemiological Society of London, February 5, 1855.

Cholera.

"In the autumn of 1852, when the re-appearance of cholera in this country was considered probable, an active inspection of the town was instituted by the Public Health Act Committee ; the bye courts and lanes were thoroughly cleansed ; the gully grates trapped ; the foul open ditch behind the North-street was cleansed and filled in ; and many other local nuisances throughout the borough were removed. On the report of the first death from cholera in Newcastle, in 1853, the like measures were again resorted to. The courts, lanes, and common lodging-houses were inspected by the health-committee, aided by other members of the town council. Every common lodging-house in the town was peremptorily ordered to be lime-washed and cleansed within 48 hours, an order which was strictly obeyed. A large staff of carts and men were at once employed to cleanse all the courts, lanes, and back passages in the town, which, after the rough dirt was removed, were sluiced with water thrown into them by a powerful fire-engine afloat on the river. All the courts and smaller streets, after being thus perfectly cleansed, were lime-washed. Depôts of quicklime for the use of the poor were placed in convenient places throughout the borough, at the expense of the Board of Health : and to induce them to make free use of it, the local authorities personally visited the inhabitants of the localities in which cholera had formerly prevailed. Ruinous channels were repaired ; and where the gullies were imperfectly trapped this was rectified, and chloride of lime, of which a ton was speedily consumed, was profusely used for the purpose of disinfecting them. In the course of 14 days the town was brought into as good a sanitary state as possible under existing circumstances, 1,500 cartloads of manure having been removed in that short period from the vicinity of human habitations. The entire expense incurred by these operations amounted to 230*l.*, which was afterwards reduced to less than 200*l.* by the sale of the manure."

The second case relates to the distribution of cholera-deaths during two epidemics in the southern districts of London. These districts (comprising nearly a fifth of the entire population of the metropolis) have been notorious for the great severity with which cholera has visited them on each occasion of its epidemic prevalence in England. During the last invasion these districts were accidentally the seat of a gigantic sanitary experiment; and a difference in one sanitary condition was seen to influence most remarkably the distribution of the cholera-mortality. For throughout those districts, during the epidemic of 1853–4, there were distributed two different qualities of water ; so that one large population was drinking a tolerably good water, another large population an exceedingly foul water ; while in all other respects these two populations (being intermixed in the same districts, and even in the same streets of these districts) were living under precisely similar social and sanitary circumstances. And when, at the end of the epidemic period, the death-rates of these populations were compared, it was found that the cholera-mortality, in the houses supplied by the bad water, had been 3½ times as great as in the houses supplied by the better water. This proof of the fatal influence of foul water was rendered still

Cholera.

stronger by reference to what had occurred in the epidemic of 1848–9. For on that occasion, the circumstances of the two populations were to some extent reversed. That company which during the later epidemic gave the better water, had given during the earlier epidemic even a worse water than its rival's; and the population supplied by it had at that time suffered a proportionate cholera-mortality. So that the consequence of an improvement made by this water company, in the interval between the two epidemics was, that, whereas in the epidemic of 1848–9 there had died 1,925 of their tenants, there died in the epidemic of 1853–4 only 611; while among the tenants of the rival company (whose supply between the two epidemics had become worse instead of better) the deaths, which in 1848–9 were 2,880, had in 1853–4 increased to 3,476.* And when these numbers are made proportionate to the populations or tenantries concerned in the two periods respectively, it is found that the cholera death-rates per 10,000 tenants of the companies were about as follows:—for *those who in* 1848–9 *drunk the worse water*, 125; for *their neighbours, who in the same epidemic drank a water somewhat less impure*, 118; for *those who in* 1853–4 *drank the worst water which had been supplied*, 130; for *those who in this epidemic drank a comparatively clean water*, 37. The quality of water which (as is illustrated in the first three of these numbers) has produced such fatal results in the metropolis—causing two-thirds of the cholera-deaths in those parts of London which have most severely suffered from the disease—has been river-water polluted by town-drainage; water, pumped from the Thames within range of the sewage of London; water which, according to the concurrent testimony of chemical and microscopical observers, was abundantly charged with matters in course of putrefactive change†.

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* Since the epidemic of 1854, this company has had recourse to purer sources of supply.

† *See* "Report on the Influence of Impure Water in the last Two Epidemics of Cholera," 1855. When I inquired, with Mr. Hume and Mr. Bateman, into the causes of the severe epidemic of cholera at Newcastle and Gateshead, such evidence as we could collect on the influence of the water-supply (which had been partly pumped from the Tyne) did not justify us in saying more than that "the water was such as ought never to have been distributed, and that on the most favourable view we can adopt, it must be regarded with grave suspicion in relation to its influence on the late outbreak." In many instances, there has been reason to believe that some of the most destructive outbreaks which have occurred in particular groups of houses have depended on the use of well-water, into which impurities had either been carelessly thrown or had drained or leaked through the adjoining soil. Numerous highly instructive illustrations, both to this effect, and generally as to the influence of polluted water, have been collected by Dr. Snow in various writings from 1849 to the present time; especially in his work "On the Mode of Communication of Cholera," 1855. The facts have been brought together by Dr. Snow, with a view to illustrate his peculiar doctrine (first advanced in 1849) as to the contagiousness of cholera. This doctrine is, that cholera propagates itself by a "morbid matter," which, passing from one patient in his evacuations, is accidentally swallowed by other persons as a pollution of food or water; that an increase of the swallowed germ of disease takes place in the interior of the stomach and bowels, giving rise to the essential actions of cholera, as at first a local derangement; and that the "morbid matter of cholera having the property of reproducing its own kind, must necessarily have some sort of

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2. Under the Registrar General's head of *Typhus* (which does not include infantile fever or remittent fever) there were recorded during the nine years 1848–56 as many as 156,340 deaths; being at the rate of 17,371 deaths per annum.

The common judgment of the medical profession on the controllability of continued fever is well expressed in a phrase which the late M. Baudens, an eminent physician of the French army, used in describing his Crimean experience of the disease:—*On pourrait le faire naître et mourir à volonté.*

It is essentially a disease of filth. Where the unventilated atmosphere of habitually overcrowded places reeks with a stagnant steam from the breathing and sweating of its inhabitants—a steam which condenses in fœtid drops on the window panes, or soaks and rots in the papered or plastered walls; or where putrefying fæces are accumulated in cesspools or ill-

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structure, most likely that of a cell." Against this doctrine almost insuperable arguments have been stated; not least, that in cases where recent choleraic evacuations have undoubtedly been swallowed, cholera has not resulted; and that the fœtus in utero (who must of necessity be out of reach of deglutitional infection) has, after its mother's death by cholera, been found also dead with rice-water effusion in its bowels. Dr. Snow's illustrations are very far from proving his doctrine: but they are valuable evidence of the danger of drinking fecalised water during the epidemic prevalence of cholera. And whatever may be the worth of the theory, it has been of use in contributing to draw attention to the vast hygienic importance of a pure water-supply; and Dr. Snow's most zealous labours in collecting evidence on this subject deserve grateful acknowledgment from every one who is interested in the subject. Some interesting and important experiments, made in 1854 by Professor Thiersch of Erlangen, seemed to show that cholera evacuations *in the course of their decomposition* acquire contagious property. It is much to be regretted that experiments were not simultaneously conducted by Professor Thiersch with a view to determine whether ordinary fæces, or ordinary diarrhœal fæces, *undergoing decomposition during an epidemic period*, would not likewise have acquired that property; for the prevalence of exterior conditions which tend to determine in certain localities a specific infectious decomposition of excrement seems to be the essence of an epidemic period. That this decomposition may begin in bowels, as well as in cesspools, seems possible enough; and perhaps herein lies the explanation of the many cases in which human intercourse has apparently diffused the disease. For, according to the observations of Professor Pettenkofer at Munich and Professor Acland at Oxford, it would seem that during cholera-periods the immigration of persons suffering diarrhœa has been followed by outbreaks of cholera in places previously uninfected; and Professor Pettenkofer ascribes this fact to an infective influence exerted by the fæces of such persons in the cesspools and adjoining soil of ill-conditioned places to which they go. An infection of this kind would probably extend itself to the polluted well-waters of such soils, and might render them, if swallowed, capable of exciting cholera by direct contagion. It is encouraging to sanitary reformers to observe that cases of apparent introduction of cholera-contagion by human intercourse are essentially different from such cases of infection as are presented by measles or small-pox. The multiplication of poison in the latter diseases takes place exclusively within the human body; it has no immediate dependence on differences of medium; and wherever human beings can cross one another's path, the susceptible person may contract infection. But the cholera-poison, if indeed it can at all be multiplied within the body, almost certainly has its great centres of multiplication elsewhere, in those avoidable foci of corruption where excrement accumulates and decays. And likewise, for diffusing its contagion, if truly the disease be contagious, foulness of medium seems indispensable. Indeed, it is no ordinary foulness which taints air or food or water with the leaven of decaying excrement. Therefore, as regards cholera, it seems highly probable that the immigration of infected persons might occur to any extent without exciting epidemic outbreaks, if it occurred only into places of irreproachable sanitary conditions, especially as regards the supply of water, and the continuous removal of house-refuse. Compare Pettenkofer über die Verbreitungsart der Cholera, 1854; Acland on the Cholera at Oxford, 1856; and Thiersch's Infections-versuche an Thieren mit dem Inhalte des Cholera-darmes, 1856.

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conditioned drains, to taint the air or leak into the drinking water of a population; there this disease prevails in one or other of its forms.

In one or other of its forms, I say;—for the researches of modern pathologists have shown that for accuracy's sake it is requisite to distinguish at least two forms of continued fever.* And it seems highly probable that these forms, while both equally associated with filth, are yet not both essentially associated with the same kind of filth. One of them (the *typhoid fever* of modern observers) has intimate affinity to the cause last mentioned—the fæcal pollution of air and water. The other (which is now distinctively called *typhus*) more nearly associates itself with over-crowding, especially of destitute persons, and probably has its essential source in the putrefaction of their undispersed exhalations. The typhoid form, specially affecting the intestinal canal, is, in its nature as in its causes, very closely related to the diarrhœal diseases already spoken of. There exists no conclusive evidence to show whether this form of disease be in any degree or any manner contagious; but almost certainly it cannot spread atmospherically by means of exhalations from the sick. Distinctive typhus, on the other hand, works its chief results without affecting the bowels. Possibly its first and greatest influence is exerted on the blood, but its symptoms are chiefly obvious in the nervous system, the skin and the lungs; and the exhalations from a patient undergoing it are, till they have been neutralized by dilution with pure air, capable of communicating the same form of disease. It has some hitherto unexplained connexion with extremes of poverty and destitution. No such ravages have been made by it as when it has been associated with famine, and—apparently by reason of this association—has prevailed as a national epidemic.†

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* While writing, I observe that a paper, including original observations apparently of much importance on the subject of continued fever, has just been communicated to the Medico-chirurgical Society by Dr. Murchison. In respect of the distinction between the typhus and typhoid forms, this paper (so far as may be judged from the abstract of it published in the British Medical Journal of June 12th) strongly supports the opinion expressed in 1849 by Doctor William Jenner, in his classical essay on the subject, that "the specific cause of typhus and typhoid fevers are absolutely different "from each other."

† It would be mere speculation in the present state of knowledge to dwell on certain analogies which exist between the state of persons dwelling in foul atmospheres and the state of persons suffering starvation. It may suffice to observe, that they probably have in common a defective defecation of the system. The starved body, which cannot renew the waste of its texture by the ordinary resources of food, probably ekes out its being and maintains the continuity of its organs by stuff, which, under ordinary circumstances of nutrition, would have been discharged as effete. Thus, probably, it comes to consist to an abnormal extent of stale material in a state verging on dissolution. And just as the rags of poverty may by a touch be torn asunder, so those half-starved tissues which they cover fall under very small injuries into disproportionate ulceration and gangrene. The fact that during times of famine masses of population are found with their textures and juices in this state (undefecated because unrenewed) may perhaps have something to do with their fatal susceptibility to typhus; for, under such circumstances, the contagion of this form of disease will spread and multiply (like the contagion of small-pox amid an unprotected population) at a rate quite disproportionate to the sanitary defects of localities.

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A knowledge of the distinction between these two forms of disease has hitherto not become general enough in England for the name of typhoid fever to have been kept separate in the registration-returns. Though probably much more fatal in ordinary years than the true typhus, with which it is confounded, it has hitherto no statistical existence. I have therefore no choice but to speak of continued fever as though it were but a single form of disease, communicable from person to person.*

Among the 105 registration-districts into which Dr. Greenhow has inquired, there is none but has suffered deaths from fever. The death-rate from this cause has ranged from 21 in one district, 33 in a second, and under 50 in five others, to 204, 207 and 209. The fact of a few deaths from fever cannot be accepted as conclusive proof of sanitary neglect in the district where they have occurred; for unavoidable contagion may have been imported—even the fatal cases themselves may have come—from the fever-nest of some adjoining jurisdiction. But I do not hesitate to say that the registration of any fever-deaths in a district not suffering from famine is a thing which, for the credit of the local sanitary authority, ought to be susceptible of some such explanation. And as the death-rate rises from a minimum of 21, which is itself an excess, to a maximum of 209, which is ten times that excess, the chance of finding exculpatory circumstances is diminished at every step. Perhaps even in the districts which have suffered least from fever such circumstances could not commonly be shown to have prevailed: but infinitely less is the probability of excuse, and infinitely greater is the presumption of gross sanitary neglect, in those districts which have suffered tenfold the minimum fatality.

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* Dr. William Jenner, who has contributed so importantly to the separation of the two forms of disease, observes: "With respect to the contagious nature of typhus "fever, I know no one who entertains a doubt. If typhoid fever be contagious, it is "infinitely less so than typhus fever." That the experience of the London Fever Hospital (in days when that distinction of forms was not yet drawn) was conclusive as to the infectiousness of "fever" is shown by Dr. Tweedie in the following sentences. "Every physician, with one exception (the late Dr. Bateman) who has been "connected with the Fever Hospital has been attacked with fever during his attend- "ance, and three out of eight physicians have died. The resident medical officers, "matrons, porters, domestic servants and nurses have one and all invariably been the "subject of fever; and the laundresses, whose duty it is to wash the patients' clothes, "are so invariably and frequently attacked, that few women will undertake this duty. "The resident medical officer was attacked with fever, and it became necessary to "appoint some one to perform his duties. The first person who thus officiated took "the precaution of sleeping at home, yet his duties were soon interrupted by an attack "of fever, which confined him a considerable time. He was succeeded by an indi- "vidual in robust health, a disbeliever in the doctrine of contagion. He performed "his duty only ten days, when symptoms of severe fever appeared. There is no "security in this narrative, striking as it is, against the favourite argument of the "non-contagionists; but the following collateral circumstances present an obstacle to "the intrusion of malaria, which only bigotry or the spirit of partizanship can enable "it to surmount. The Fever Hospital stands in the centre of a large field, where the "production of malaria is exceedingly improbable; and on the same lawn, and "within a few yards of it, stands the Small-pox Hospital; but no case of genuine "fever has occurred among the medical officers or domestics of that institution for "the last eight years."—*See Cyclopædia Pract. Med., Art. "Contagion."*

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The undoubted contagiousness of one form of fever may, as I have said, be a partial exculpation of districts where deaths from typhus have been registered; but even this, only at the expense of other districts whence the contagion has come, and without any lessening of the national responsibility for the quantity of preventable death. And where many fever-deaths have been registered, the exculpation cannot be more than partial. Quite exceptionally, a well-ordered household may receive the fatal contagion from some filthy hovel which has bred it. But generally speaking the contagion has little tendency to multiply itself, except where the same conditions exist as those under which it began. Oftenest of all, therefore, it is from hovel to hovel, from crowded lodging-house to crowded lodging-house, that the infection of fever spreads. Whether it be commonly requisite for the origination of fever in these filthy places that the specific contagion should each time be re-introduced from without, is a theoretical question on which the medical profession is not unanimous; but the practical lesson, respecting which there is no difference of opinion, is admirably taught by the most eminent medical teacher* of the present generation, as "the unquestion-" able fact that fever is fostered and spread through those impu-" rities which sanitary measures are intended to banish . . . The " specific exciting cause of continued fever cannot, perhaps, be " utterly expelled or precluded; but when present in a commu-" nity it may be rendered comparatively harmless by taking " away the main conditions of its morbiferous efficacy and of its " faculty of propagation."

Every collection of medical experience teems with instances to illustrate what are those "main conditions" on which the fatality of fever depends. Such instances are of every degree of magnitude, but in substance they all agree. The experience of common lodging-houses,† the experience of single courts in a town,‡ the experience of hospitals and workhouses,§ the experience of barracks,* the experience of the navy,† the experience of FEVER.

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* Dr. Watson in his Lectures on the Practice of Physic. Fourth edition, vol. ii. p. 835.

† *See* Assistant-Commissioner Harris's Report on the Operation of the Common Lodging-houses Acts, 1857; and an illustration given by Dr. Wyld in the Transact. of the Social Science Association, p. 482.

‡ *See* Dr. Southwood Smith's Report to the Poor Law Commissioners in 1838; a paper which especially deserves to be referred to, because the commencement of State-interference on behalf of the health of the labouring classes may be said to date from its publication, and to have been in a very important degree determined by its facts and arguments. *See* also Report (with evidence) of Commissioners for inquiring into the State of Large Towns and Populous Districts.

§ *See* Sir Gilbert Blane on the Prevalence of different Diseases in London, and Miss Nightingale's Evidence before the Commissioners appointed to inquire into the Regulations affecting the Sanitary Condition of the Army. Last century's familiar fever, in its epidemic form, was "the hospital-fever" as well as the "gaol-fever." Sir Gilbert Blane mentions that in 1783, when he was elected physician of St. Thomas's Hospital, "febrile infection prevailed there so much that his two imme-" diate predecessors, and one of the surgeons, beside several of the menial attendants, " had died in the course of the preceding year of fever caught in the hospital; upon " which the number of patients was reduced, and new methods of cleanliness and " ventilation were adopted. All the wards (he continues) have ever since been annually

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" whitewashed; the strictest attention has been paid to the cleanliness of bed and " body clothes, washing, sweeping, and all other means of removing offensive matter." As I happen to have been long connected with St. Thomas's Hospital, I may mention that, in five and twenty years, during which I have been intimately acquainted with its working under those improved arrangements, I have not known of any physician or surgeon or apothecary contracting fever, and but rarely have heard of the disease extending to a nurse or sister in constant attendance on the sick. During the Crimean campaign there was a time when in the Scutari hospitals "typhus attacked both sick " and well. . . Also there were frequent relapses of fever . . . and the wounded " having come in for wounds, frequently died from fever." The lady who made her beneficent home in these dreadful scenes, and who has laboured her utmost to render their recurrence impossible, describes the circumstances of the sufferers:—"The " space for each patient was one fourth of what it ought to have been. . . . " It is impossible to describe the state of the atmosphere in the barrack " hospital at night. I have been well acquainted with the dwellings of the worst " parts of most of the great cities in Europe, but never have been in an atmo- " sphere which I could compare with it. . . . The sewer gases blow into the " wards and corridors. A change of wind so as to blow up the open mouths of " the drains was, therefore, not unfrequently marked by outbreaks of fever " among the patients. . . . The drinking water was not free from organic " matter; on one occasion the dirty hospital dresses have been seen in the tank which " supplied water. . . . A dead horse also lay for some weeks in the aqueduct." It needs not be said that fever was only one of many murderous diseases which prevailed under those circumstances. And when the causes of "hospital fever" were extinguished, hospital gangrene and cholera and diarrhœa went as the fever went; for the hospitals were at last brought to a sanitary condition, in which Miss Nightingale could say of them, "I know of no buildings in the world I could compare with them, the " original defect of construction of course excepted."—*Evidence*, especially 9,998, 10,006, 10,014.

* Dr. Balfour, the Secretary of the Army Sanitary Commission, furnished for the report a memorandum on the health of the Guards stationed in the Tower of London during the fifteen years 1839–54; dividing this period into three stages, as it were, of sanitary experiment. 1st, from April 1839 to September 1843, the troops were exposed to emanations from the tidal ditch into which the drains of the Tower emptied their contents; 2ndly, from October 1843 to September 1849, the ditch had been dried, but the troops were still quartered in old, badly-constructed barracks, and were supplied with water from the river; 3rdly, from October 1849 till February 1854, the men occupied the new barrack, and were furnished with water of excellent quality for cooking and drinking. Concurrently with these changes the rate of admission into hospital on account of continued fever and typhus declined from 107·11 in the first period to 93·73 in the second and 59·11 in the third; while the death-rate from the same diseases diminished from 4·79 in the first period to 3·06 in the second, and 2·97 in the third. During the five successive years, 1843–7, M. Boudin observed at the Military Hospital at Versailles, that about the month of October there was a very fatal epidemic of typhoid fever, consisting exclusively of cases admitted from the garrison of St. Cloud. This epidemic began a week after the king's arrival, and disappeared directly after his departure; it never affected either the civil population of St. Cloud, or the officers, or even the *sous-officiers*, though the latter inhabited the same barrack as the corporals and soldiers. M. Boudin's inquiry gave him the following solution of the case:—The garrison of St. Cloud at its ordinary strength of four to five hundred men enjoyed good health; but when, on the king's arrival, its strength was raised to twelve hundred—and this number was packed into narrow unventilated spaces—the fever broke out. The sous-officiers, beside being better fed and less worked, had always at least one room for each two of their number.

† See Lind's "Essay on the most effectual Means of Preserving the Health of Seamen in the Royal Navy," 1757, and Sir Gilbert Blane "On the Comparative Health of the Navy" during the fifty years 1779–1829. As late as 1780 Haslar Hospital received from the channel fleet 5,539 cases of fever in the year. But not fifty years afterwards the Vice-Admiral of England (Lord de Saumarez, who died at an advanced age in 1836) was able to say, that within his recollection the efficiency of the navy had been doubled by improvements in its health. For (says Sir G. Blane) while "scurvy had been extirpated" by that general introduction of lemon juice, which marks the year 1796 as "an era in the history of the health of the navy, " fever also had been greatly subdued...by improvements in the method of pro- " moting ventilation and cleanliness, and particularly by the strict discipline adopted

prisons,*—all are to the same effect. Every history of the worst prevalence of fever, when it has existed independently of famine, has connected its ravages with overcrowding and filth.

Not a century has passed since it was distinctively the disease of prisons. It was the *gaol fever* of our great John Howard, who well knew the sanitary circumstances which develop it. And no better illustration can be had of those circumstances—no better illustration of the control which society possesses over them—than is afforded by turning from the prisons of the present day, wherein epidemic fever is an unknown disease, to the prisons of the last generation.

It was in 1777 that Howard (dedicating his work to the House of Commons "in gratitude for the encouragement which they had given to the design") drew attention to various forms of cruelty in the then prevailing system of prison discipline, and specially alleged that prison-life, such as it then was, engendered diseases by which "many who went in healthy are in a few months "changed to emaciated dejected objects." He described the atmosphere of prisons:—"My reader (he says) will judge of "its malignity when I assure him that my clothes were "in my first journeys so offensive that in a postchaise I could "not bear the windows drawn up, and was therefore obliged to "travel commonly on horseback. The leaves of my memorandum "book were often so tainted that I could not use it till after "spreading it an hour or two before the fire; and even my "antidote, a vial of vinegar, has, after using it in a few prisons, "become intolerably disagreeable. I did not wonder that in "those journeys many gaolers made excuses, and did not go with "me into the felons' wards . . . Any one may judge of the probability there is against the health and life of prisoners "crowded in close rooms, cells, and subterraneous dungeons for "fourteen or fifteen hours out of the four-and-twenty. In some "of these caverns the floor is very damp; in others there is "sometimes an inch or two of water, and the straw or bedding "is laid on such floors, seldom on barrack bedsteads . . . Some "gaols have no sewers or vaults, and in those that have, if they "be not properly attended to, they are, even to a visitant, offensive "beyond expression . . . In some prisons the window tax, "which the gaolers have to pay, tempts them to stop the "windows and stifle the prisoners. In many gaols, and in most "bridewells, there is no allowance of bedding or straw for pri-

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"and enforced in the channel fleet; fever, of which the 'ascertained cause' had "been 'air contaminated by foul and stagnant exhalations, particularly those from "the living body;' fever, which had 'been a more grievous and general source of "mortality in the navy than even the scurvy, being more difficult to deal with both "in point of prevention and cure.'" The kind of atmosphere may be inferred from Dr. Lind's statement:—"I have known a thousand [imprest] men confined together "in one guardship, some hundreds of whom had neither a bed, nor so much as a "change of linen. I have seen many of these brought into Haslar Hospital in the "same clothes and shirts they had on when pressed several months before."

* In contrast to the quotations from Howard in the text, see the Reports of the Inspectors of Prisons, and the Essay of Dr. Baly on the Mortality in Prisons.

"soners to sleep on; and if by any means they get a little it is "not changed for months together, so that it is offensive and "almost worn to dust. Some lie upon rags, others upon the "bare floors." He then spoke of the necessary consequence of this life :—"I am ready to think that none who give credit to "what is contained in the foregoing pages will wonder at the "havoc made by the gaol fever. From my own observations "in 1773, 1774, and 1775, I was fully convinced that many more "prisoners were destroyed by it than were put to death by all "the public executions in the kingdom. This frequent effect of "confinement in prison seems generally understood, and shows "how full of emphatical meaning is the curse of a severe creditor, who pronounces his debtor's doom to *rot in gaol.* I "believe I have learned the full import of this sentence from the "vast numbers who, to my certain knowledge, and some of them "before my eyes, have perished by the gaol fever."

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It is almost unnecessary to say that the state of things which Howard described has not been witnessed in the prisons in England by any one of the present generation. The keeping of criminals has been amended with due regard to sanitary requirements; and now, if even a single felon were known to die in England under circumstances which 85 years ago were the rule and habit of prison life, the whole strength of public opinion would express itself as against a murder. Yet, outside that privileged area, fever continues its ravages. It continues them under circumstances which—except for the mere bars and bolts of the prison-house—are identical with those which Howard described. And if his language seems familiar to the eye, it is not because his work has of late years often been consciously quoted. It is because the same close dark cells, the same damp floor, the same fœtid atmosphere have had to be again and again described by officers of health and parochial medical officers; no longer indeed as the scandals of prison discipline, but as constituting the too frequent household circumstances of the poor.

Chiefly from among our labouring population fever takes its annual seventeen or eighteen thousand victims. And besides the thousands whom it kills, there are many times the number whom it prostrates for weeks and months, and whom, with their families, it impoverishes or perhaps ruins and pauperises.

Howard closed his memorable appeal by suggesting that "even "if no mercy were due to prisoners, the gaol distemper is a "national concern of no small importance." Its claims to this rank of importance are surely not yet at an end, while its causes remain virulent in the homes of our working population, while its cruel contagion is maintained at their cost, and while so many thousand lives are yearly sacrificed to the negligence which lets it continue.

3. *Pulmonary affections,* including phthisis, cause very nearly a quarter of the annual mortality of England. Every 100,000

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of our population yields on an average 552 annual victims to this deadly class of disorder.

This death-rate is far from being uniform throughout the country. In the northern division of England the death-rate is only 463; in the adjoining north-western division it is 683; in Cumberland and Herefordshire it is 435; in Lancashire it is 706. Still wider is the range of difference in the district death-rates. They vary from 216, 242 and 304, to 851, 859 and 999.

In order to recognize the local conditions which determine these differences of death-rate, it is requisite to distinguish three principal forms of pulmonary affection.

Phthisis.

a. First, there is *pulmonary phthisis,* which kills on an average in England more than 50,000 persons a year. And beside these who die under the pulmonary form of tubercular disease, 8,000 more are annually registered as dying of *scrofula* and *tabes mesenterica.* And under the same constitutional tendency, manifested in still other forms of local disease, there must remain other thousands to count.

(Scrofula.)

Phthisis, therefore, deserves especial study; not only because of the 50,000 deaths which it annually causes; but because it is the type of a great family of diseases, whereof the other members are hitherto less perfectly registered than it; and because, in observing the local distribution of deaths by phthisis, we can tolerably well estimate the distribution of many thousands of other deaths.

There is a further reason, for which the mortality by phthisis ought to be very jealously criticised; a reason, for which its local differences of pressure deserve quite peculiarly to be regarded as a matter of national concern. The tendency to tubercular disease is one which transmits itself from parent to child; and thus, if in any one generation the disease be artificially engendered or increased, that misfortune does not confine its consequences to the generation which first suffers them. *Whatever tends to increase tubercular disease among the adult members of a population must be regarded as assuredly tending to produce a progressive degeneration of race.*

In proceeding to criticise the range of death-rate by tubercular phthisis, I must observe that the nature of the disease exempts its death-rate from many sources of fallacy to which the local statistics of some other diseases are subject. Phthisis is chronic, non-infectious, non-epidemic: in districts of some size it is not likely to vary much from year to year; and a septennial average of its district-pressure must almost of necessity give a true representation of what it professes to represent. But as phthisis principally affects the ages subsequent to puberty, statistical results are perhaps most trustworthy when they are calculated for ages over 20. And because certain diseases which may be wrongly confounded with true phthisis are much more frequent in the men than in the women of the districts which suffer them, the female death-rate is a surer test than the male. Accordingly

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the most decisive figures for measuring differences of local death-rate by phthisis are those which relate to the female population, and especially to the female population at ages above puberty.

District death-rates by phthisis generally (without distinction of sex or age) range from 134, 144, 165, 173 and 183 to 390, 407, 409, 421 and 445. The female death-rate by phthisis ranges from 156 to 517. The adult female death-rate by phthisis ranges from 229 to 588.

These figures bear unequivocal testimony to the operation of local causes in the production of tubercular disease. The most important among such local causes is shown by Dr. Greenhow to consist in the industrial relations of the people. The great contrasts are found to lie between populations, respectively agricultural and manufacturing. *In proportion as the male and female populations are severally attracted to in-door branches of industry, in such proportion, other things being equal, their respective death-rates by phthisis are increased.*

This fact associates itself with a very important result, which was well developed a few years ago by Dr. Baly in his admirable essay on the mortality in prisons. From examination of the medical records of the Milbank Penitentiary, he had learnt " that the mortality caused by tubercular " disease had been between three and four times as great during " the eighteen years, 1825–42, among the convicts confined in " this prison as it was in the year 1842 among persons of the " same period of life in London generally ; and that three-fourths " of the excess of deaths from all causes in the Penitentiary " above the rate of mortality of all persons in the metropolis of " the same period of life had been due to the prevalence of that " disease." Comparing the large number of prisoners in whom tubercular disease of the lungs first showed itself while they were in the Penitentiary with the small number who were affected with it at the time of their reception, he was convinced " that imprisonment exerted here a very powerful influence in " causing the development of the disease." Extending his inquiry to the other prisons of England, and to the prisons of other states in Europe and America, he found that the influence was one of universal operation, and learnt (as might have been expected) that other forms of scrofula were developed in the same proportion as pulmonary phthisis ; that not merely this one form of the infliction, but tubercular disease in all its forms, resulted from the long-continued influence of imprisonment on the bodily health. This influence appears to be partly physical and partly moral :—among its component parts (with cold and poorness of diet) Dr. Baly enumerates deficient ventilation, sedentary occupations, and want of active bodily exercise, and a listless or dejected state of mind.*

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* Of the points referred to by Dr. Baly, there are some in which the life of a textile population, especially of a textile factory-population, is comparable to the life of prisoners. At its best it has to a great extent the evils of monotony, of deficient bodily

PULMONARY AFFECTIONS.

Phthisis.

During the fifteen years which have elapsed since the publication of Dr. Baly's paper, progress has been made toward removing from prison-life many causes of scrofulous disease; and as the fever-mortality of Howard's time long ago followed the removal of its causes, so, no doubt, the high tubercular mortality of prisons is at present in course of extinction.

It is to be hoped that the evil, as it exists in our great centres of manufacture, may prove to be not inevitable.

Removable causes have notoriously in many cases so much to do with the increase of tubercular disease, that it at least deserves patient and skilful inquiry to determine whether the development of phthisis among men and women engaged in manufacture really be an essential appanage of such employment, even when not excessively laboured in, or depend perhaps on defective ventilation and other removable accidents of the system. The opinion of the medical profession would certainly incline to the latter view. It would suggest that an inquiry into the sanitary circumstances of our great manufacturing populations must almost certainly lead to the discovery of evils which may be palliated or removed, and consequently to the indication of means for lessening this cruel tax on the industry of our people. Inadequate ventilation is an influence not unlikely to prevail where numbers of persons work together in one in-door employment; and medical experience would point very decidedly to this influence, wher-

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exercise, of physical seclusion from sun and air, and of mental privation from what is beautiful and animating in external nature. And thus probably, even at its best, it tends to produce some amount of vital depression, some kind of mental and bodily etiolation during which (especially in the case of persons otherwise predisposed to scrofula) there is a heightened liability to tubercular disease. Under an abuse of the factory system, these evils may be infinitely developed, in proportion to fewness of holidays and length of daily work time; most of all, no doubt, where the overtasked population does its work in ill-ventilated places. The Saturday half holiday, if it becomes general, is likely to be of considerable importance in mitigating the evils referred to. And generally speaking, it may be said that employers who take an interest in promoting the recreation of their workpeople, especially by out-door exercise or the pursuit of natural history, are great sanitary benefactors. The number of such men is now not inconsiderable; and the relations between capital and labour are, I believe, every year becoming more merciful. From a most interesting paper (*On the relations betwixt Employer and Employed under the Factory System; by Edward Akroyd, M.P.*) in the Transactions of the Social Science Association, I extract the following description of the resources and inducements for recreation which one manufacturer—the author of the paper—has provided for his nearly 5,000 operatives :—" A library is attached to the works, to which any of my work-people " have access free of charge. A news-room is provided, supplied with the newspapers " of the metropolis and of the locality, and also with the current periodical literature. " A band is established at the works, and its performances are very creditable. It " plays out of doors occasionally when the weather is favourable, at other times in a " room provided for that purpose. Allotment gardens are provided for the workmen, " and in connexion therewith a horticultural and floral society has been established to " promote the knowledge and cultivation of fruits, flowers, plants, and vegetables. " An exhibition is held annually, at which prizes are given for the best productions " of the respective gardens. To strengthen the habit of observation, and to cherish a " taste for the beauties of nature, I give prizes for the best collection of wild plants " and ferns growing in the neighbourhood. Recreation grounds are provided for the " juvenile and adult members of the establishment, and every encouragement is given " to the practice of healthy out-door sports and athletic games."

PULMONARY AFFECTIONS.

ever it exists, as an adequate explanation of high tubercular mortality.*

Phthisis.

In corroboration of this view, I may cite the very important facts recently elicited by the Commissioners appointed to inquire into the Sanitary Condition of the Army. The Commissioners state that, "while in civil life [population of 24 large " large towns] at the soldiers' ages the deaths by pulmonary " diseases are 6·3 per 1,000; they amount in the cavalry to " 7·3; in the infantry of the line to 10·2; in the guards to " 13·8 per 1,000; and that of the entire number of deaths " from all causes in the army, diseases of the lungs constitute " . . . in the cavalry 53·9 per cent.; in the infantry of the " line 57·277 per cent; in the guards 67·683 per cent." They argue, "that in civil life insufficient clothing, insufficient and " unwholesome food, sedentary and unwholesome occupations, " and the vitiated atmosphere of unhealthy dwellings all contribute to the propagation of this class of diseases. But " in the army it cannot be alleged that the clothing, the food, " or the nature of the occupation in itself are of a character " which would justify the imputation that they are among the " predisposing causes of the excessive mortality of the soldier by " pulmonary disease." And they accordingly conclude, "that " the ravages committed in the ranks of the army by pulmonary " disease are to be traced in a great degree to the vitiated " atmosphere generated by overcrowding and defective ventilation, and the absence of proper sewerage in barracks: . . . " this one cause acting with such intensity, especially when " superadded to a certain amount of exposure, as not only to " produce in the foot guards an amount of the disease in " question which is greater than is produced in civil life by all " the four causes united, but which actually carries off annually " a number of men in the infantry nearly equalling, and in the " guards actually exceeding, the number of civilians of the same " age who die of all diseases put together."

Pulmonary inflammations.

b. A second very important part of the mortality from pulmonary affections is that which consists in deaths from common *non-tubercular pulmonary disease* among the labouring population. And the best available materials for comparison are got by taking together all diseases, except phthisis, of the respiratory

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* One of the most eminent of French physicians (M. Baudelocque, writing in 1832) described this class of diseases as almost exclusively due to particular conditions of the atmosphere in which the patient resides, asserting, namely, that if the houses are so placed that the sun's rays cannot reach them, or the fresh air be renewed without difficulty,—if, in short, they are small, low, dark, and badly aired,—scrofulous disease will inevitably supervene. And although his opinion in its extreme form is not generally received by the medical profession, nearly all writers concur in recognizing the very great degree in which scrofulous manifestations depend on removable causes, and especially on unwholesome conditions of dwelling. Dr. Watson (in the recent edition of his lectures, vol. i. p. 107) says,—" Scrofula " depends in part upon hereditary constitutions; it partly arises also from exposure " to cold and wet; but there is most reason for believing that impure air is a very " powerful agent in calling scrofula into action, and in aggravating the strumous " diathesis."

PULMONARY AFFECTIONS.

Inflammations.

organs in the male population at ages above twenty. The local death-rates calculated from these materials range from 66 to 869. And Dr. Greenhow shows the important fact, that *high death-rates in the present category mainly depend on the local pursuit of particular branches of industry.* Two kinds of occupation are in this especially hurtful; first, those which give rise to mechanical irritation of the air passages, by diffusing in the air of workplaces any considerable amount of metallic or earthy grit, or even of flax-dust or cotton or woollen fluff; secondly, those in which the operatives are exposed to abrupt changes of temperature. At the head of the first class, Dr. Greenhow places the mining of lead, tin, and copper; and he specially refers to "the most exclusively lead-mining district " in England," as one which loses by diseases of the chest in consequence of its prevalent employment a " larger annual " proportion of its adult male inhabitants than the unhealthiest " city in the kingdom," and as "the place in which there is a " larger proportion of widows than in any other place in the " kingdom." Towns which are the seat of fine manufacture in metals (especially of cutlery-manufacture) and towns where certain textile manufactures are carried on, and districts of pottery-manufacture, are shown to suffer high mortality from the same class of diseases. Again, in some of the above-named occupations, as well as in various other branches of industry, there are processes which require to be conducted at a high temperature; so that the operatives, especially in winter, are exposed to vicissitudes of heat and cold, and derive from this cause such liability to lung disease as affects very considerably the death-rate of the district. It is not easy to separate this influence from the other with precision enough for statistical purposes; but it seems probable that the high mortality of male operatives in pottery-manufacture may be more due to this cause, while that of female operatives in the same manufacture would be rather due to mechanical irritation of the lungs. For the biscuit-rubbing (which diffuses a quantity of gritty dust) is chiefly done by women; while the slip-kilns (in which the pappy "slip" of clay and flint is evaporated at a high temperature) as well as the baking kilns and furnaces are of course tended by men.

It seems probable that in some districts the chronic inflammatory diseases which result from mechanical irritation of the lungs are not properly distinguished from true tubercular phthisis; and that deaths from the former diseases are often mistakenly certified for registration under the name of "consumption." Fallacy from this source is avoided by taking together as a single group all affections of the respiratory organs, *tubercular and non-tubercular;* and when this is done, the resulting scale of adult male death-rates is seen to range from 221 and 306 to 1,298 and 1,440. The two last death-rates belong to the two principal lead-mining districts: and, that their enormous excess depends on the prevailing male occupation, is made manifest by Dr. Greenhow's figures. He shows that in these very two districts, where the male death-rates are respectively 1,298 and 1,440, the corresponding female death-rates are but 717 and 779. And this fact is the more convincing, because it seems that, apart from interfering circumstances, the pulmonary death-rate of adult females tends to be somewhat higher than that of adult males.

PULMONARY AFFECTIONS.

Inflammations.

c. The *infantine death-rate from pulmonary affections* is a third very important head under which to consider our national mortality from that class of disease. Every year more than 23,000 children under five years of age die of inflammations of the respiratory organs, besides nearly 4,000 whose deaths are attributed to phthisis. And these 27,000 deaths are so unequally distributed, that the corresponding death-rate in proportion to the infantine population ranges from 213 in the healthiest district of England to 2,897 in the unhealthiest. The causes of this immense range of death-rate may most conveniently be considered as part of the general question of infantine mortality.

Inflammations in infancy.

4. The *death-rates of young children* are, in my opinion, among the most important studies in sanitary science. In the first place their tender young lives, as compared with the more hardened and acclimatised lives of the adult population, furnish a very sensitive test of sanitary circumstances; so that differences of infantine death-rate are, under certain qualifications, the best proof of differences of household condition in any number of compared districts. And, secondly, those places where infants are most apt to die are necessarily the places where survivors are most apt to be sickly; and where, if they struggle through a scrofulous childhood to realise an abortive puberty, they beget a still sicklier brood than themselves, even less capable of labour and even less susceptible of education. It cannot be too distinctly recognized that *a high local mortality of children must almost necessarily denote a high local prevalence of those causes which determine a degeneration of race.*

MORTALITY OF YOUNG CHILDREN.

The Registrar General has not for many years analysed the infantine death-rates of England. But on the one occasion, when he published such an analysis (relating to the years 1838–44) it appeared that in some districts the death-rates of childhood were five times as high as in others; and I have no reason to question that similar inequalities prevail at the present time.

Deaths which occur in excess within five years of birth are mainly due to two sets of causes; first, to the common infectious diseases of childhood prevailing with unusual fatality; and, secondly, to the endemic prevalence of convulsive disorders, diarrhœa and pulmonary inflammation.

a. First, then, as regards the *infectious diseases of childhood:* —Scarlatina, measles, hooping-cough and small-pox have, during the eight years 1848–55, destroyed 297,555 persons. Their

Infectious diseases.

MORTALITY OF YOUNG CHILDREN.

average annual fatality amounts to about 37,000 deaths. In about three fourths of the total number of deaths, the subjects are under five years of age.

Infectious diseases.

These diseases, both separately and jointly, have produced very different death-rates in different districts of England. But special caution is requisite in drawing conclusions from these death-rates. On the one hand, the diseases spread by personal infection;—their diffusion in any district must commonly have been determined by the arrival of an infected person, and by his coming into contact with others who had not yet suffered from the infection with which he was suffering. On the other hand, atmospheric influences have apparently much to do with the epidemic spread of infection; and the influences most favourable to the process, in respect of one disease or another, are absent sometimes for considerable lengths of time.* The disease in consequence prevails very unequally in different years, and its inequalities are not simultaneous in all places. It may happen, especially with remote districts, that the infection is absent from among the population at a time when exterior circumstances are favourable to its extension and fatality; and a low death-rate may result from this accident. Or the opposite may be the case;—the infection may be present, with facilities for its personal communication, at a time when exterior chemical conditions are tending to produce what is called an "epidemic period;" and the result will of course be a widely different one. Single years are thus unable to count for a great deal in the calculation of local death-rates; and the comparison of such death-rates is therefore inevitably fallacious, unless it be founded on the experience of considerable periods of time.†

I therefore do not insist much on district-differences, but refer exclusively to those larger results which it seems impossible to misunderstand.

Measles, hooping-cough and scarlatina.

As regards *measles, hooping-cough and scarlet fever*, looking only to very large masses of population, and comparing the four

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* Such influences are very imperfectly known to us. Differences of chemical action in the atmosphere—perhaps differences of chemical action of solar light—seem especially to deserve study, but are hitherto almost uninvestigated. As regards some diseases (especially the diarrhœal) solar heat appears to tell with great effect; but mere difference of temperature does not make the difference between a year when cholera prevails epidemically and a year when it cannot become epidemic. With reference to the action of heat in favouring diarrhœal diseases, it is proper to remember Magendie's statement (*L'Union Médicale*, 1852, p. 236) that by injecting into the blood-vessels two grammes or even one gramme of putrid material during very hot weather, he could produce death as certainly as by injecting three, four, or even ten grammes during winter.

† When I observe, for instance, in regard of small-pox, that in certain districts its fatality in single years has been 40, 50, 60, even 90 per cent. of its entire septennial fatality, I am not disposed to consider seven years as a sufficiently long period for determining the true small-pox death-rate of small and remote districts. As a check on the tendency to draw too absolute conclusions from the vital statistics of short periods of time, it is instructive to notice what long periods are requisite for determining the laws of phenomena in other departments of science, where the disturbing influences are not more numerous than here. Mr. Glaisher finds "that a period of daily observations of 43 years is insufficient to determine the mean daily temperature."

MORTALITY OF YOUNG CHILDREN.

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Measles, hooping-cough and scarlatina.

millions who occupy the south-eastern quarter of England with the two and a half millions who occupy the north-western counties, I find that the aggregate death-rate from those complaints among the latter population is more than twice as great as among the former. At first sight, one might be disposed to attribute this difference to the greater facilities for mutual infection which exist among the densely collocated population of the north-western counties, and to the consequently earlier age at which on an average the infection is likely to be contracted;—influences, which of course count for something. But (as will presently be seen) certain non-infectious diseases of infancy, especially the convulsive disorders, are in even a greater excess in the same counties. And this fact renders it extremely probable that, if that denser gathering together of the population be the cause of the increased mortality from infectious disorders, it produces its effect not only by rendering the disorders more prone to spread, but likewise by rendering them more fatal to those whom they attack. In other words, it probably illustrates on a large scale one of the effects of overcrowding and defective ventilation, for there can be no doubt that these sanitary defects, existing to the degree in which they would develop the nervous disorders of infancy, would greatly aggravate the fatality of the infectious diseases in question. The fact perhaps further illustrates that very terrible possibility to which I have adverted —an increasing weakness of life in the population of our great centres of industry.

Other influences essentially connected with poverty, will tend to make all these diseases more fatal in places which are thronged with a poor labouring population. And possibly there exist in respect of each disease (especially perhaps in respect of scarlatina) certain conditions of local climate — unexamined conditions of soil and water-supply, for instance—which may be not indifferent to the result. But these matters are hitherto uninvestigated; and I do not feel justified in saying more, than they seem to me well deserving of investigation. For *the wide range of local death-rates from measles, hooping-cough and scarlatina, among districts where all the populations have undoubtedly had abundant means of becoming infected, leads to the conclusion that local influences of one kind or another must have been very greatly concerned in determining the proportionate fatality.*

Small-pox.

Small-pox during the nine years 1848–56 killed 41,290 persons, being at the rate of 4,587 a year. As to the almost entire preventability of these deaths there is, among competent persons, no difference of opinion. In countries where vaccination is general, the fatality of small-pox has under its influence declined to some small fraction of that which formerly prevailed; so that where formerly in a given population there would have occurred 100 deaths by small-pox, there now occur as few as 4 or 5. Of those who still die of small-pox in England, the immense majority are non-vaccinated or ill-vaccinated persons; and *it is certain that, if vaccination were universally performed*

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in the best known manner, deaths by small-pox would be among the rarest entries in the register.

The absence of small-pox deaths from the mortality returns of any district, especially of a remote district, does not of necessity indicate that the population is well protected by vaccination; for accidentally it may have happened that during several consecutive years the contagion of small-pox has not been introduced, and that the protectedness of the population has in consequence been untested. But the converse proof is a sufficient one:—the presence of many small-pox deaths in local returns is evidence that vaccination is not satisfactorily practised. Accordingly, the very large continuance of small-pox to which I have adverted is among the most painful facts which are to be gathered from the registration-returns of England. To foreign nations, who have learnt from us the means of preventing small-pox, it must seem almost incredible that we still annually suffer four or five thousand deaths by the disease. And the Registrar General's last quarterly report is in this respect a curious illustration of the slow rate of social progress, containing evidence as it does that in *certain considerable districts of England, during the three months ending March* 31, *sixty years after Jenner's discovery, deaths by small-pox were amounting to a fourth part of the entire district-mortality.*

No evidence can be more conclusive than this as to the neglect of vaccination in certain parts of the country. But other evidence unfortunately is not absent. In the report which I had last year the honour to present on the subject of vaccination, and in a very excellent paper "On Public Vaccination in England and Wales," communicated by Dr. Seaton to the Association for the Promotion of Social Science, such neglect is abundantly proved. "It is calculated (says Dr. Seaton, in the Memorial of "the Epidemiological Society), that where the Vaccination Act "works well, 80 per cent. of the births will probably have to be "provided for by the public vaccinator.... In looking at the infantile public vaccinations for 1854, there will be found unions like "Halifax, Biggleswade, and Lincoln, in which there were respectively 73, 82, and 87 per cent. of the births; while in Liverpool "there were but 57 per cent.; in Hastings, 44 per cent.; in "Newport, 40 per cent.; and in Northampton but 27 per cent. "Now what may be done in a town like Halifax may surely "be compassed in Liverpool, in Newport, or in Northampton. "There can be no conceivable reason why the results which "have been attained at Lincoln should not be reached at Hastings. If 90 per cent. can be vaccinated in the Conway union, "why should only 40 per cent, be vaccinated in that of Holyhead? "I need scarcely say, that it is not for a moment contended that "all unions should exhibit *the same* per-centage of public "vaccinations. In every union there will be local circumstances "to be taken into account,* which will influence, and even in

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* "The migratory character of the population in some unions, and the extent to which gratuitous vaccination is given by medical men, not public vaccinators, are circumstances of this kind."

MORTALITY OF YOUNG CHILDREN.

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Small-pox.

“ some districts (as the colliery districts, where special arrange-
“ ments are made) influence materially this per-centage; but,
“ making an allowance for these, no such discrepancies as those
“ I have pointed out ought to exist, and any objection which may
“ be raised on that score may altogether, or in a great measure,
“ be got rid of, by taking *the same* town in different years.
“ Take Durham, for example, in which the public vaccinations
“ were 71 per cent. of the births in 1854, 46 per cent. in 1855,
“ and again 60 per cent. in 1856; or Newport, 40 per cent. in
“ 1854, 62 per cent. in 1855, and only 33 per cent. in 1856;
“ or Devizes, 72 per cent. in 1854, 38 per cent. in 1855, 29 per
“ cent. in 1856; or Winchester, 68 per cent. in 1854, 39 per
“ cent. in 1855, 32 per cent. in 1856. In the same town, with
“ any regular system at work, the per-centage of vaccinations
“ would under ordinary circumstances scarcely vary.”

Acute non-infectious diseases.

b. Convulsive or nervous diseases, diarrhœa and *respiratory inflammations* may properly be considered together as regrds their endemic prevalence among young children. Their conjoint operation is to destroy every year about 72,000 children, and thus to occasion about a sixth part of the total mortality of England. They are eminently the diseases of towns, perhaps especially of great manufacturing towns. And I take them together, because I have some doubts whether the comparative absence of one or even two of these diseases may not sometimes be counterbalanced by the very high development of another,* and whether it might not in consequence be easy to draw wrong conclusions from an isolated scale of death-rates by one of the diseases exclusively.

It hardly needs to be stated that these diseases are produced by other than endemic influences. That abrupt changes of temperature and imperfect protection against cold favour inflammation of the lungs and air-passages, that improper food (specially likely to be given to the children of the poor) produces diarrhœa, that the irritation of teething and many other temporary influences cause convulsions, no one questions. But why should the resulting death-rates vary as they do in different districts of the country? The average death-rate produced by these disorders in three of the healthiest rural districts of England (taken together, since these districts are small, to increase the basis of comparison) is 925;—in the unhealthiest district of England the corresponding death-rate is 6,895. Why are these non-infectious infantine complaints seven times as fatal in one district as another? To answer this question let the diseases be considered separately.

Convulsive disorders.

First, of *nervous disorders incidental to early life,* there have died during the nine years 1848–56 as many as 330,881 young children, or annually almost 37,000. And the distribu-

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* One remarkable case to illustrate this question may be quoted from Dr. Greenhow's paper. The highest death-rate by infantile nervous disorders (3,832) is in a district where the infantile death-rate from diarrhœa is only 35, and that from respiratory affections only 351.

MORTALITY OF YOUNG CHILDREN.

Acute non-infectious diseases.

Convulsive disorders.

tion of this large infantine mortality has been strikingly uneven throughout the country; the resulting local death-rates per 100,000 male children under five years of age having ranged, from 302, 355, 561, 836 and 847, to 2,938, 3,107, 3,301, 3,496 and 3,886. Some of the districts with low death-rates are small, and comparatively few additional deaths would have influenced their rate; but a fair estimate of the very great extent of real range, apart from all sources of fallacy, may be gathered from the fact that the average death-rate by these diseases throughout the north-western counties of England is about 2½ times as high as throughout the eastern, south-eastern, and south midland counties.

Two thirds of the deaths under consideration are registered as deaths by "convulsions;" and probably there is little real difference between these and the other cases which are grouped as "nervous disorders of infancy." Accordingly, the history which I am about to quote, though it nominally relates to only one form of these diseases, may be considered equally instructive in reference to them all. It consists in the remarkable experience of the Dublin Lying-in Hospital, as told by Dr. Collins, formerly master of the institution. Seventy-four years ago this experience was to the effect, that of 17,650 children born in the institution, 2,944 had died within the first fortnight; being more than every sixth child, or about 17 per cent. on the births; and that nearly all these deaths (19 out of every 20) had been occasioned by "nine-day fits." Dr. Clarke, who at that time was master, "considered a foul and vitiated state of "the air in the wards of the hospital to be the principal cause "of this disease," and adopted arrangements by which "a free "circulation of air was at all times secured through the wards, "and effected in such a way as to put it out of the power of "the nurses to control it." Of 8,033 children born subsequently to the wards being ventilated, as described, only 419 died; being about $5\frac{1}{5}$ per cent. on the births, or less than a third part of the previous mortality. Under additional improvements the death-rate became still further reduced. Among 16,654 infants born during the seven years of Dr. Collins's mastership, only 286 died (being 1·7 per cent.), and of these only 37 from the disease which had formerly been so fatal; so that, within 50 years of Dr. Clarke's reform, the general mortality had been reduced to one tenth of what it was, and the special convulsive mortality to one sixty-eighth of what it was.

Secondly, the infantile mortality which arises in *non-tubercular diseases (almost exclusively inflammations) of the respiratory organs* is very large. In 1856 the deaths of children under five years of age from pneumonia, bronchitis and croup amounted to 28,763. Of the preventability of these diseases I cannot give so compact an illustration as that which I have just quoted in reference to the nervous diseases of infancy. But I may remark that their great prevalence in localities which have bred the largest share of certain other endemic diseases has often struck

MORTALITY OF YOUNG CHILDREN.

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me; and that I have thus been led, from the time of my earliest engagement in sanitary matters, to class the pulmonary inflammations of infancy among the diseases which are oftenest of endemic origin. This view receives definite support from Dr. Greenhow's figures, which show a range of infantile death-rate by these diseases of the lung, from 155 as a minimum to 2,397 as a maximum. The mother—whose tendency it is to refer "taking cold" to out-door influences exclusively, and who, if her child's breathing ails, tortures her own conscience with doubts whether he has been exposed ever so little to one wind or another, and whether it would not be safer to keep him altogether within doors—might usefully study this part of the statistics. The more favourable of the death-rates under consideration are those of rural populations, the two lowest of all belonging to the two most northerly of Dr. Greenhow's 105 districts; while the high death-rates eminently belong to towns, and are no doubt mainly dependent on those poisonous in-door influences which attend in such large proportion on the urban residence of the poor, and develop to so great an extent the other forms of infantile mortality.

Diarrhœa.

Thirdly, by *diarrhœa* and *dysentery* there annually die more than 11,000 children under five years of age. The death-rate ranges, from an average of 76 in three of the healthiest districts, to 1,452 and 1,687 and 1,779. This in itself (unless infantile diarrhœa were an exception to what I have stated of diarrhœa generally) would suggest as almost certain that, in the places where the high death-rates prevail, there must be operating against the lives of the community those evils which specially depend on defects of house-drainage, with consequent non-removal of animal refuse from about the dwellings and water-sources of the population. And, in fact, it will be seen in Dr. Greenhow's tables, that the seats of a high diarrhœal mortality among young children chiefly exist amid those dense urban aggregations of life where the well-organised removal of refuse-matters is so specially indispensable to health. Part of the result, even a considerable part, depends no doubt (as is the case with all excessive infantile mortality) on the engagement of mothers in various branches of industry; which, leading to their absence from home, must occasion on a very large scale in some places the improper feeding of infants. But that the other influence is not inoperative—that the causes of adult diarrhœa are likewise to a great extent the causes of infantile diarrhœa—seems quite unquestionable And in illustration of this statement, I cannot do better than quote the following very remarkable passage from the well-known work* of Dr. West on the diseases of early life. "Although " (says Dr. West) while I was physician to the Finsbury dis- " pensary, a large amount of disease among children as well as " among adults came under my notice, yet *my acquaintance*

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* Lectures on the Diseases of Infancy and Childhood. Third edition, p. 489.

MORTALITY OF YOUNG CHILDREN.

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Diarrhœa.

" *with those severer forms of infantile diarrhœa which approach*
" *to the character of dysentery, and which give rise to similar*
" *lesions, has been derived almost exclusively from observations*
" *in Lambeth and the adjoining parishes.** The children in
" both districts are alike subjected to the evils of improper and
" insufficient food, and of close and ill-ventilated dwellings; but
" in the latter there are superadded certain very important
" influences of a local character. A considerable portion of this
" district on the Surrey side of the Thames lies below high-
" water mark, and the kitchens and cellars of some of the houses
" near the river become flooded at unusually high tides. The
" sewerage throughout is very defective: in many parts it is
" effected entirely by open drains, while in some places there
" are mere cesspools which have no communication with any
" drain whatever. Cases of infantile dysentery do not occur
" with the same frequency in all parts of this district, but they
" are most numerous and most severe wherever these noxious
" influences are most abundant."

Reverting, then, once more to the gross mortality due among young children to the conjoint action of those three classes of disease which I have now separately spoken of, I believe that *the vast range of that aggregate mortality in different districts of England is due to the varying prevalence of two local causes :—*

first, to differences of degree in *common sanitary defects* of residence; some places abounding more than others in the foul air and foul water of undrained, unpaved, unscavenged, unwashed, unlighted, unventilated localities and houses ;—

and, secondly, to *occupational differences* among the inhabitants; there being certain large towns where women are greatly engaged in branches of industry away from homes; where consequently these homes are ill kept; where the children are little looked after; and where infants who should be at the breast are improperly fed or starved, or have their cries of hunger and distress quieted by those various fatal opiates which are in such request at the centres of our manufacturing industry.†

Means do not exist for appreciating at all accurately the proportionate influence of these two sets of causes. That the second of them is of great importance cannot be denied; and it is on

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* "To this statement I may now add, that since the opening of the hospital for sick children, the patients of which come from much the same district as that inhabited by my former patients at the Finsbury Dispensary, I have not yet seen, among 3,400 cases, a single instance of severe dysentery."

† Examinations which have been made of the causes of mortality of foundling-institutions, throw light on many influences which are likely to be injurious to infants whose mothers are withdrawn from them. A series of papers containing the result of such examinations has lately been published by Dr Routh, in the British Medical Journal, 1858. Want of breast-milk is of course recognized to be a frequent and powerful influence in producing the high mortality of foundlings; but another and chief cause (according to the observations of M. Hervieux) is found to consist in the "want of exercise and the abuse of the recumbent position" to which un-nursed children are especially exposed. The infant of the engaged mother would be almost as apt as the foundling to suffer from these evils.

MORTALITY OF YOUNG CHILDREN.

Acute non-infectious diseases.

this account, as well as on other accounts, a thing greatly to be desired, that the large manufacturing employers of female labour should address themselves to counteracting, as far as possible, the domestic evils which result from that system of industry. But lest the proportionate influence of this cause should be exaggerated, it is necessary to observe that the highest death-rate among infants, not only from the diseases here spoken of, but likewise from infectious diseases, exists in a large town where the population is not manufacturing. Taking together the common infectious disorders of infancy with those nervous and diarrhœal and respiratory diseases which have last been spoken of—an annual total of more 100,000 deaths—we find that they are distributed in different places according to an aggregate death-rate which ranges from about 1,303 to about 9,044; that the low rate belongs as an average to three of the healthiest districts of England, and the high rate to the one unhealthiest district; that the last is not a manufacturing town; and that the causes in operation there to produce its immense infantile mortality must presumably be those unwholesome conditions of dwelling which local authorities, under the Nuisances Removal Act and other sanitary laws, are specially empowered to counteract.

SUMMARY OF RESULTS.

I have now spoken of those kinds of disease which, because of their immense fatality, deserve especial consideration. I have referred to facts which are notorious as to the causation of such diseases.

In the subjoined figures you can read at a glance that vast range of their local death-rates which Dr. Greenhow has the merit of having made evident for public information.

1. *Annual death-rates, by diseases which are either wholly or almost wholly preventable under good sanitary arrangements, have ranged in different districts as follows:—*

Cholera.	Diarrhœa and Dysentery.	Continued Fever.	Small-pox.
From nothing to 403	From 4 to 345	From 21 to 209	From nothing to 146

2. *Annual death-rates, by diseases which to some considerable extent are inevitable, but of which the severity or the frequency may be controlled by good sanitary arrangements, have ranged in different districts as follows:—*

Tubercular Phthisis in Women.	Non-tubercular Lung-diseases in Men.	Common Infectious Disorders of Childhood.	Convulsive Disorders of Childhood.	Pulmonary Affections of Childhood.
From 229 to 588	From 66 to 869	From 694 to 2149	From 280 to 3832	From 213 to 2897

And let me beg leave again to bring before you the several totals of death which year by year are thus unequally distributed. Looking at the last eight or nine years* for which materials are before me, I find that the annual average of deaths by the *three diarrhœal diseases* has amounted to 26,388; by *fevers* (typhus, typhoid, infantile and remittent) to 18,616; by *small-pox*, to 4,587; by *tubercular diseases* (male and female, at all ages) to 57,982; by *non-tubercular respiratory diseases* (male and female, at all ages) to 50,273, whereof 23,020 have belonged to childhood; by the *common infectious disorders* to more than 32,000; by the *nervous disorders of childhood*, to nearly 37,000. Here altogether are 227,000 deaths, annually distributed with the utmost inequality. After reasonably estimating the degrees in which they severally are preventable, it can no longer seem so difficult to make a very large beginning towards striking off the annual 100;000 deaths against which the Registrar-General protests as deaths of artificial production.

Other preventable causes of death.

Many others remain; but, after speaking of preventable deaths which may be counted by tens of thousands, it seems almost trivial to dwell on diseases which annually kill but a few thousands among them.

Yet some of them deserve notice.

Ague.

Ague does not overtly kill even two hundred a year. Yet if one may judge by the experience of the Peterborough Hospital (where out of 1,394 cases during nine years only one proved fatal) the injured are immensely numerous in proportion to th directly killed.† And beyond all doubt, the deaths are much less infrequent than they seem; for when the malarious influence destroys life in this climate, almost always it is by secondary results; and the deaths which thus occur are registered, not as ague-deaths, but as due to dropsy, or liver-disease, or other abdominal affection.

It needs not now to be shown that ague is preventable. Before the time of the great fire of London—or let me rather say, before the better draining and paving which attended the reconstruction of London — endemic ague was among the most prevalent and most fatal diseases of the metropolis. Even a century ago, according to Dr. Fothergill, it still had a considerable prevalence. Now it is scarcely (if at all) known to us, except as imported from the undrained marsh-districts of other parts of the kingdom, where appropriate means have not hitherto been employed for its extinction.

Scurvy.

Purpura and *Scurvy* annually kill from two to three hundred persons. In their origin and nature these diseases are different; and it is therefore to be wished that they could have been separately enumerated.* Scurvy, it is well known, is but a modified starvation, dependent on the absence of vegetable food. It was this disease which used to decimate our navy and render long sea-voyages almost impossible. It was mainly by scurvy that Anson, in his celebrated voyage of 1740–2, lost within the first ten months nearly two-thirds of his crew, and during the remaining period about half of the survivors. It was against scurvy that Cook had attained his great success, when in 1775, after three years absence, he brought back a healthy crew, which, out of 112 men, had lost only one by disease. And the perfect preventability of scurvy is well shown in the experience of our navy; from which, even in the year 1780, Haslar Hospital received as many as 1,457 cases; and in which at present the disease is never seen. Undoubtedly, therefore, it is by neglect of sanitary precautions, and through punishable disobedience to the law,† that scurvy to a considerable extent still prevails in our mercantile marine, and that so many cases of great severity are still received into civil hospitals situated in the neighbourhood of our docks. In land-life the common consumption of the potato serves so completely to prevent scurvy, that poverty perhaps never becomes an occasion of the disease, except when the potato-crop has failed. Voluntary abstinence from vegetable diet is sometimes, but very rarely, the circumstance to which an individual case of scurvey on shore may be ascribed. But the main source of such scurvy as still exists in England is no doubt maritime, and depends on the absence of due provision for the diet of crews during long voyages. The "Weekly Return of new cases of sickness in the public institutions of the metropolis," communicated to the Board of Health by the Association of Officers of Health, has occasionally during the last few months quoted striking facts of this kind from the experience of the hospital ship "Dreadnought."‡

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* For some diseases I have been favoured by the Registrar-General with the unpublished figures for 1856. In these cases my average is founded on the nine years 1848–56; in other cases, on the eight years 1848–55.

† *See* Dr. Greenhow, *seq.* page 105.

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* In the Registrar-General's Report for 1855, scurvy is distinguished from purpura. Out of 197 male deaths and 127 female deaths attributed to the two diseases, sixty male and thirteen female deaths are specially referred to scurvy.

† Mercantile Marine Acts: 7 and 8 Vict. cap. 112.; 13 and 14 Vict. cap. 93.; 14 and 15 Vict. cap. 96.; and the Passengers Act, 15 and 16 Vict. cap. 44.

‡ Ex. gr. October 24; "All the scurvy cases [six] were returning from India and came in *two* ships; in one, all the provisions were bad; in both, the lime juice. It is the common tale in all scurvy cases admitted here, that the lime-juice was either bad or deficient."—November 7; "One of the [new] scurvy cases occurred in the return voyage from the East Indies; there were sixteen hands working the ship, and fifteen had scurvy; the provisions were good. The lime-juice taken from England was expended on reaching India, and what they had obtained there turned bad before they were out of the Bay of Bengal; consequently they were without this necessary during the remainder of the voyage."—November 28; "The case of dysentery is that of a man who has previously suffered from the same disease, and who ascribes its recurrence to cold and the want of *lime-juice* in returning from India; the lime-juice supplied having been stale and unfit for use."—December 5; "Three cases of scurvy were admitted from the ship 'Ardbeg,' belonging to Glasgow. The provisions were tolerably good, but only two table-spoonfuls of lime-juice were allowed every eight days. The Act requires half an ounce of lime-juice to be given daily, but it is little attended to."—January 30; "A case of scurvy was admitted from a Hamburg vessel, destined for California, with six hands, five being disabled by scurvy."—March 13; "Ten cases of scurvy have been admitted. Five of these patients are from the 'Countess of Seafield,' from Shanghai. The crew consisted of ten; out of which one died, and six were dis-

Puerperal fever.

Puerperal Fever is registered as killing about 1,500 mothers a year. Probably other fatal cases of the disease are included in the list of about 3,000 women annually described as dying of *peritonitis* and of *childbirth*. Statistically, the number is not large. But every one must wish it were less; for death rarely falls with more individual heaviness than when it comes in this form to rob the household of a mother in her happiest and hopefullest moment. And the death strikes every observer so essentially in the light of an accident, that it makes more impression of suddenness and evitability than almost any death not actually by violence. Fortunately the disease is in a very unusual degree preventable; for the experience of Lying-in-Hospitals enables us quite confidently to class it among the putrid infections. Its propagation has in too many instances been traced to personal agencies which, now that they are understood, it would be criminal not to guard against; and its ordinary origin stands in intimate relation to sanitary faults which never ought to surround either the healthy or the sick.

In respect of the General Lying-in-Hospital in the York Road, during the twenty years 1837–56, Dr. Rigby, the physician of the Institution, has publicly alleged that the mortality (almost entirely from puerperal fever) ranged, *according to the efficiency or inefficiency of ventilation*, from less than 5 to more than 90 per 1,000 cases delivered. Exception having been taken by the Committee of the Hospital to some parts of Dr. Rigby's statement, the statistics were re-examined, with special regard to any questionable facts, by Dr. Odling, the Medical Officer of Health of Lambeth. This gentleman, setting aside periods in regard of which any doubts could be raised, and comparing ten years during which he believed it to be "admitted by both parties, that "systematic ventilation *was not* practised," with seven years during which he believed it to be "admitted by both parties "that systematic ventilation *was efficiently* practised," found that during the former period the death-rate had been 46·42, during the latter period only 4·81, for every 1,000 deliveries. And after making allowance for other influences (among which serious defects of drainage had been mentioned) Dr. Odling concluded his letter to the Committee by pointing out "that for "seven years co-incidentally with efficient ventilation there was "an extraordinarily low death-rate, and that the change from "ventilation to non-ventilation was in a few months time "followed by an increase of mortality."

That women may receive the infection of puerperal fever at the hands of those who previously have been in attendance on cases of erysipelas, is now among the certainties of medicine. It has been established by a large amount of very fatal experience

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" abled by scurvy. None of the officers were affected. The passage lasted four " months and twenty-one days. Only a gill of lime-juice and a pint of vinegar were " allowed per fortnight for the first two months. Even bread was deficient. The " other cases came from the 'Sirocco,' of Sunderland, from Bombay, and the 'Jane,' " of Liverpool, from Callao."

Puerperal fever.

And that the same contagion may arise in ordinary post-mortem putridity, and be propagated from this source, is likewise certain. Immense mortality from puerperal fever in one division of the Vienna Lying-in-Hospital, varying from about a fourth to about a ninth part of all the deliveries which took place there, was believed by Dr. Semelweiss, the head of the department, to depend on an infection of which "the *real source was to be found in* "*the hands of the medical men in attendance contaminated with* "*cadaveric poison.*" The other division of the hospital (reserved for the practical instruction of midwives, whose training does not require them to be brought into contact with dead bodies) suffered only about a tenth part as much as the first; and this was the more noticeable as the second division was inferior to the first in the size and airiness of its wards. Dr. Semelweiss, acting upon his supposition as to the cause of the disease, required that the male attendants of the first division should, as much as possible, avoid contact with cadaveric matter; that after such contact they should never make a vaginal examination till the following day; and that, besides very thoroughly cleansing their hands, they should systematically *disinfect them with a solution of chlorine.* The latter precaution was not introduced till some months after the more general precautions had been adopted. The result of these measures was, that the mortality of the first division at once fell to the usual average of the second division. In 1846, the death-rate per cent. had been $13\frac{2}{3}$; in 1847 it was $5\frac{1}{5}$; in 1848 it was $1\frac{1}{3}$.*

Erysipelas.

Erysipelas by name kills about 2,000 a year, and under other names, perhaps many more. It has two forms not distinguished in the registers, and probably not essentially different; whereof one particularly belongs to surgical practice, as an occasional very serious complication of wounds. The poison of this *traumatic erysipelas* seems to be identical with that of puerperal fever. Intimately associated with the atmosphere which breeds it, are other calamitous influences, which are apt to prevail with erysipelas epidemically in the wards of ill-kept hospitals, threatening every open wound of every patient who lies there, arresting the vital processes of repair and putrefying its material, infecting the whole blood with mischief propagated from the part converting slight injuries into grave dangers, and often defeating the success of the best-performed surgical operations. The experience of the old Hôtel Dieu (*maison de Dieu, porte du ciel*) was in this respect most lamentable: and no wonder—when Howard used to see "five or six in one bed, and some of them "dying"—that "hardly any acute cases, childbed cases, or "capital operations survived," or that the operation of trepanning was laid aside as one which for fifty years had never been known to succeed.† The Scutari Hospitals, during the earlier

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* *See* Dr. Routh on the Epidemic Puerperal Fever of Vienna. Med. Chirurg. Trans. xxxii.

† *See* Sir Gilbert Blane in the remarks on St. Thomas's Hospital, in his paper on the Prevalence of Different Diseases in London.

Traumatic erysipelas, hospital-gangrene, pyæmia.

part of the Crimean war, illustrated a similar connection of cause and effect, under circumstances to which I have already adverted;[*] and here, as in the Hôtel Dieu and in innumerable other instances, the evil ceased under a system of stricter cleanliness, improved ventilation, and diminished crowding. The old hospital ship "Dreadnought" had acquired a very evil reputation for the prevalence of these infections; dependent, no doubt, in part on the natural ill-adaptedness of a ship to the purposes of a hospital; but probably also in part dependent on organic contamination still lingering in the wooden walls of the wards. Early last year another more commodious ship was substituted for the "Dreadnought;" and Mr. Tudor, the resident surgeon, informs me that, whereas in the two years preceding that change 9 out of 22 amputations had terminated fatally, only one amputation had proved fatal out of 16 performed in the year following the change; and that, whereas formerly erysipelas and hospital-gangrene were so common and so spreading as to have let him see there at one time as many as 18 cases of hospital-gangrene, he has now scarcely seen erysipelas, except in patients admitted with it, from whom, as a rule, it no longer spreads to other inmates of the ward.

Erysipelatous fever.

Erysipelas of the kind which is not associated with wounds has, in some respects, more affinity to the eruptive fevers than to the above-mentioned traumatic diseases, and might therefore conveniently be called by the distinctive name of *erysipelatous fever.* But the circumstances under which it arises have appeared to me so often to be circumstances of local unwholesomeness, that I am disposed to believe there is little essential difference between this form, which begins as a febrile attack, and the other form, which begins as a local infection; and as the latter is quite unquestionably due to defective sanitary conditions, so I have strong suspicion that the former will be found a very infrequent disease when the causes of other endemic contagions have become less rife.

Insanity.

Insanity, according to the registers, causes only 500 deaths per annum; but of 7,650 deaths annually attributed to *paralysis,* and 1,840 annually attributed to *epilepsy,* many, no doubt, are of insane patients. It deserves attention that, so far as very imperfect statistics can determine the matter, insanity appears to be increasing in this country. In the last (eleventh) report of the Commissioners in Lunacy it is mentioned that in 1852 the number of pauper lunatics and idiots was returned by the Poor Law Board as 21,158; but in 1857, as 27,693. No disease has less immediate connexion than insanity with such exterior influences as are under the control of local sanitary authorities; but there is not an absence of indirect connexion. The mental activity which belongs to eager competition in a crowded and ambitious country is a frequent cause of cerebral disorder to persons who from parentage or other circumstances are predisposed to it; and this special influence is, of course, likely to develop itself in proportion as the particular period is fraught with occasions of excitement and fatigue. But what deserves here to be borne in mind, just as in reference to the development of scrofulous and tubercular disease, is the great power of all depressing circumstances to co-operate with the special cause. Those whom privation or disease has recently exhausted, or whose health is chronically deteriorated by unwholesome conditions of occupation or residence, succumb to the operation of mental causes which the brain of the healthy body could bear without injury. It is under such circumstances that many of our labouring classes suffer their first access of mental derangement; and I have every reason to believe that if we could obtain accurate statistics of the local distribution of insanity we should find its excesses among those parts of the adult population which suffer the largest preventable mortality from consumption and its kindred disorders. **Insanity.**

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[*] See preceding page xviii.

Violence. *Violence* in more than 14,000 annual instances, is the registered cause of death. Generally on this class of premature deaths, I have not yet been able to make my inquiries with sufficient minuteness to learn what prospect there may be of lessening their large annual amount, and can only venture to name some among them which to my present knowledge seem susceptible of reduction.

In about 422 of the above cases fatal *poisoning* was discovered. To what further extent it may have operated without discovery, and to what extent the adulterations of food and drugs have been hurtful to life, are questions which at present I have no means of solving. The law (Vict. 14 and 15, cap. 13.) which forbids arsenic to be sold otherwise than colored, and except with full registration of the sale and in presence of a witness known to both buyer and vender, has probably diminished the felonious uses of that drug; and an extension of the principle of that Act, to the regulation of the sale of all such poisons as are commonly used for criminal purposes, would greatly diminish the present almost unrestricted facilities for clandestine homicide.

In more than 5,000 cases *wounds, fractures* and *contusions* are specified as having been the causes of death; some of them homicidal, but the very large majority accidental; and of the latter, some self-inflicted by the sufferers, while many arose in the carelessness of others. It is specially the last of these classes which already has been reduced, and probably admits of still further reduction. Whatever acts of legislation, or whatever decisions from the bench, tend to increase or fix the responsibility of persons for accidentally injurious consequences of their neglectful acts or omissions, must operate in this direction; and it seems certain that the "Act (Vict. 9 and 10, cap. 93.) for compensating "the families of persons killed by accident" has therein been of essential service. The Factory Act (Vict. 7 and 8, cap. 15.) and the Act for inspection of Coal-Mines (Vict. 13 and 14, cap. 100.)

Violence.

have no doubt greatly reduced the frequency of serious accidents in both those branches of industry by increasing the responsibility of employers. Yet in 1854 the coalminers were represented to be still losing 1,000 lives per annum from accidents of a preventable kind.

Among the 14,000 lives annually lost by violence are counted more than 1,800 cases where children are *burnt or scalded to death.* These numerous deaths by fire, and other still more numerous injuries which are not fatal, are referable to the domestic habits of parents; occurring almost exclusively among the poorer classes, where children cannot possibly be tended with the same vigilance as among the rich. Probably a large share of such casualties arises during the absence of mothers engaged in branches of industry which take them from home; and it seems likely that the evil would diminish with the development of well-conducted *crèches* and infant schools, which, on other accounts, are so very greatly to be desired for the infant population of places where mothers are engaged in manufactures and other non-domestic industry.

Intemperance and other moral causes of premaature death.

About 314 among the violent deaths are annually attributed to *intemperance.* Unfortunately that number expresses only a trace of the mischief which is done to human life by the abuse of spirituous liquors. But it opens the very difficult question of *preventable deaths arising in moral causes;* and I should be dealing uncandidly with the subject, if I refrained from stating that oftentimes these are real insanitary influences rendering it a greatly more difficult task to remove such evils as are simply physical. Not only do intemperance and profligacy create diseases which, except for them, would have no existence;* but they act immensely in aggravation of the endemic causes of disease, and add to what is horrid and deadly in the unwholesomest haunts of our large cities. Yet, that justice may be done, it is well to remember that such physical and such moral conditions act and re-act on one another—that the local circumstances which are hostile to health are likewise hostile to moral and intellectual education. It has been my duty to make myself very intimately acquainted with places respecting which it may with truth be said, that vice and ignorance and brutality are among their active causes of disease. But from my first moment of personal intimacy with such places till now, my assurance has grown stronger and stronger, that it is much more difficult than the wealthy and powerful can imagine, for those who are born and bred in courts which are the nurseries of cholera, typhus, and scrofula, to emerge from their wretched childhood otherwise than vicious and ignorant and brutal. The same soil nurtures both growths of misery. And when social reformers jointly address themselves to these afflicting scenes, it is no easy problem to determine whether, by their indirect cooperation, the schoolmaster and the minister of religion do more for the bodily health, or the sanitary improver more for the progress of education and for the lessening of crime.

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* Every year from four to five hundred infants are registered as having died from congenital syphilis.

Conclusion.

In commencing this introduction to Dr. Greenhow's paper, I stated that his results appeared to me of singular importance in their bearing on sanitary administration. And it is in this practical respect that I venture to beg for them your particular attention.

It is possible that, from accidental circumstances which would only reveal themselves to a local inquirer, his figures may here and there convey a not quite perfect picture of the real state of a district. It is on this account that I have refrained from particularising any district by name in connexion with remarks which could not be other than condemnatory, lest ever in the individual case I should have overlooked even a fraction of extenuating circumstance.

But, as regards all that is of substantial importance in the figures, there is no room for fallacy. By any one who will candidly consider *what are the possible meanings of those differences of death-rates*, only one conclusion can, I think, at last be arrived at. The diseases which are shown to prevail in different districts with such surprising degrees of inequality are eminently the diseases which can be prevented. And to me the conclusion seems inevitable that in certain parts of England, sometimes by good fortune, sometimes by good local government, definite causes of disease are kept at or near their least conceivable activity; while, in other parts of England, the same causes are prevailing with as little check as if the community were one of savages to whom science had never taught her first and simplest lessons.

My own seven years' experience in the service of a local sanitary authority has given me a strong belief in the general disposition of such authorities to exert themselves efficiently against the causes of premature death, when but once they have become fully and publicly informed of the existence and fatality of such causes. *Fully informed*, I say;—because the non-removal of evils which occasion so much human misery commonly depends much less on the supineness of the local authority, as its primary cause, than on the absence of local consciousness as to the real facts of the case. *Publicly informed*, I say;—because local sanitary authorities, exercising their powers virtually without control, and being, like individual men, not incapable of indolence and error, peculiarly require that their fulfilment of very important duties should be subject to public criticism. Failing this check, it is unquestionable that the existing constitution of such authorities must sometimes endanger the objects for which they are constituted. Elected on the principle of being the representatives of rate-payers, the members are sometimes a little apt to forget that, for sanitary purposes, they are also the appointed guardians of masses of human beings whose

CONCLUSION. lives are at stake in the business. They do not always remember that the interests of life are at least as sacred as the interests of wealth. And this danger especially deserves to be guarded against; for it has not infrequently happened that local owners of low house-property have procured themselves to be elected members of sanitary boards with a view to the protection of their own unworthy interests by systematic resistance to sanitary improvement.

The suggestions which I would respectfully offer, for dealing with what appears to me a great national question, are based on this view of the case. Holding the opinion which I have stated as to the meaning of high special death-rates; feeling convinced that they substantially depend on the non-removal of local and removable causes, and that this non-removal commonly results from the absence of adequate local information as to the nature and extent of the existing evils; I would look to the systematic publication of facts, and to the influence of general opinion, as the main agencies of cure. In the last resort, if these means should fail, other remedies would assuredly not be wanting.

I submit that all such cases of high special death-rates as have been referred to in the present paper, ought to be thoroughly investigated; that *the local public and the general public and the government and the legislature ought to have before them the precise facts of each case where a preventable or partly preventable disease prevails to great excess in any particular district.*

Under the public Health Act, 1848, the Government had the power of enforcing the adoption of that Act on any locality wherein the general death-rate had on a seven years' average exceeded the common death-rate of the country. Under the Local Government Bill now before Parliament, this central power is no longer to be retained. And if it be a well-founded opinion which I have ventured to express, that the sanitary progress of localities is almost an educational matter (wherein enlightenment counts for much more than compulsion) the resignation of that power is no loss to the objects in view. But the absence of such compulsory power makes it, I submit, all the more urgently important that *the department on which will devolve the present medical responsibilities of the Board of Health should have under its habitual cognisance the class of cases to which I have particularly referred.*

The Public Health Bill now before Parliament, will if it become law provide for this object. Her Majesty's Privy Council, empowered to "cause to be made such inquiries as they see fit, "in relation to any matters concerning the public health in "any place or places," will be able to bring before local authorities, and the people under their jurisdiction, facts in which the latter are so greatly interested. The appointed officers will be able to state, not only in such general terms as I have here employed, but in terms distinctly applicable to each case investigated, what local evils have to be removed in order to abate in various districts their present tenfold or hundredfold multiplication of some preventable disease.

CONCLUSION.

But it is only to a limited extent that this kind of inquiry, as an action of Government, would be possible. The 105 districts of which the statistics are included in Dr. Greenhow's paper constitute merely a sixth part of the registration districts of England. The entire question relates to removable causes of death operating on eighteen millions of population. Government inquiry could scarcely do more than indicate year by year in a summary way the broad facts of glaring cases. It could not supersede, nor ought it to supersede, the necessity for great local exertions where so much human life is at stake. And it seems to me a very obvious conclusion to draw from the immense disparity in the pressure of different diseases, that *local authorities, most of all where large populations are concerned, are imperatively bound to keep themselves properly advised by skilled officers as to the special causes of disease operating within their respective jurisdictions.*

Throughout the greater portion of England the local authority under the Nuisances Removal and Diseases Prevention Acts is also the authority or part of the authority for poor law relief. In all such portions, therefore, it stands in relation with the system of medical attendance which (covering the whole country) is part of that relief; and nothing would be easier than for the sanitary authority, under these circumstances, to be kept tolerably conversant with whatever relates to the sanitary condition of the poor. Wherever local boards of health exist, they already possess the power of appointing medical officers; but where municipal corporations and improvement-commissioners are the sanitary authority, they commonly have not obtained in express terms the power of making such appointments. It seems desirable that the power should universally be held. And in respect of large towns, especially of large manufacturing towns, I am strongly of opinion that it should be obligatory on the local government either (as in the districts of London under the Metropolis Local Management Act) to appoint permanent officers of health, or to obtain periodical reports from occasional medical inspectors.

There is a fatal misapprehension in many minds as to the time when such officers may be useful. Too commonly it is imagined that the time for their activity is the time when epidemic disease is present; too commonly it is unknown or forgotten that just at such a time they are least able to do good. The local conditions which favour epidemic visitation are conditions which for the most part it takes time to create, and which it always takes time to remove. The death-rates of certain ordinary diseases measure those local conditions, and predict where are the sure places for epidemic mortality to fall. It is in the interval between epidemic periods that measures may be taken which, while they reduce those ordinary death-rates, give security against the dreaded invasion. But in the moment of pestilence little there can be done. Administrative bodies may suddenly have leapt, under stress of terror, to the point at which scientific information has for years been standing; panic may have rendered them as docile as they just before were incredulous; but radical sanitary reforms cannot be extemporised. If some hundreds of thousands of people in the middle of a cholera-epidemic find themselves (as was the case a few years back in Rotherhithe and Southwark and Lambeth) drinking water polluted with sewage, who is there that at a moment's notice can transplant the pumps and pipes and steam engines? Or if the broad river amid a dense population is allowed, in spite of all warnings to the contrary, to become the tidal sewer of a gigantic city, what intensity of alarm, when at last it is awakened, can shorten the years which must elapse before the consequences of that error are effaced?

It is the ordinary, not the exceptional, health of districts which most calls for sanitary reform. Let local authorities do their utmost against the daily diseases of their districts, —against the diarrhœa, against the typhus and typhoid fevers, against the small-pox, against the phthisis, against the special diseases of operatives, against the murderous mortality of infants; confidant that in taking this course they will be adopting the best precautions against occasional pestilence; and equally confidant that, in abating year by year whatever are the local redundancies of habitual disease, they will be counteracting causes of death infinitely more powerful than those which, because of their suddenness, seem so terrible in the moment of epidemic visitation.

It is to the *vast excess of severity wherewith those habitual disorders press upon certain parts of the population*, that I especially point as the presumptive evidence of corresponding sanitary faults. And the fact that those disorders are developed, some of them *in proportion to the urban character of the district*, some of them *in proportion to the manufacturing industry of the people*, is matter for very painful reflection.

Every year now adds to the relative growth of our town populations: every year increases the development of our manufacturing system; and there can be no well-wisher to the country but must rejoice in what is great and good in those wonderful manifestations of our national life. But surely it is needful to consider, whether the advantages of our social progress must have with them such evils as I have described; whether the higher civilization of urban life cannot be attained without a corresponding development of diseases, which depend on the non-removal of excrement, and the non-ventilation of dwellings; whether the manufacturing greatness of England be not compatible with better sanitary care for the lives of the employed, and with less enormous entail of infantine disease.

These questions are not uninteresting to the ratepayers of places where high death-rates prevail. For sanitary neglect is a mistaken parsimony. Fever and cholera are costly items to count against the cheapness of filthy residence and ditch-drawn drinking-water. Widowhood and orphanage make it expensive to sanction unventilated workplaces and needlessly fatal occupations.

CONCLUSION.

Nor probably will such questions appear unimportant to the public economist. For the physical strength of a nation is no mean part of its prosperity. And with us, perhaps, that raw material may have risen in value, while eastern war and westward emigration have been draining into their respective channels so much of our English manhood.

But if the subject may justly claim to be considered by the government and the legislature of this country, it is on higher grounds than those. The sacredness of human life against unjust aggression is the principle above all others by which society subsists. To have realized this principle in law and government is the first indication of a social state: and in any community pretending to be civilized, the failure of protection for life has ever been felt as a public scandal.

For a time it was only against brutal violence that the knowledge of the legislator enabled him to cope in founding the conditions of personal security; and his duty was sufficiently fulfilled when his enactments were commensurate with his knowledge. But modern civilization would scarcely have deserved its name if, with the light of its much greater knowledge, it had refrained from applying the same principle to all cases which fairly fall within its terms; and our statutes contain abundant evidence that, according to the spirit of English law, life cannot rightfully be wasted by neglect any more than it can rightfully be taken by violence.

It is indeed only by very gradual increase, that legislation and government may succeed in giving to human life the same security against the infliction of preventable disease as against the infliction of wilful violence; and millions will have died before this public carefulness for individual safety can have become co-extensive with even the present certainties of preventive medicine.

But growing knowledge must bear its fruit. It has now been fully recognized that within the very centres of civilization controllable influences are working against human life more cruelly than brute violence ever worked in the first discordant beginnings of society. It has been shown that in certain districts of England the operation of those controllable causes is vastly more powerful than in others; that, within the rule of certain sanitary authorities, particular forms of disease undergo a multiplication—a five-fold and ten-fold and hundred-fold multiplication—of their lowest familiar fatality.

To suppose that such sanitary authorities could permanently disavow an interest in this knowledge, or that public opinion

Conclusion. could long hold them irresponsible for so monstrous a waste of life, would be to misunderstand the meaning of civilisation, or to belie the humanity of England.

I have the honour to be,
Sir,
Your obedient, faithful servant,

JOHN SIMON.

To the Right Honourable the
President of the General Board of Health.

ON THE

Different Prevalence of certain Diseases in different Districts in England and Wales ;–

BY

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On the different Prevalence of certain Diseases in different Districts of England and Wales.

BY

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&c. &c. &c.

Introductory Observations.

The state of the public health varies greatly in different places In some it is comparatively good, in others exceedingly bad, and these variations are usually only local, the condition of the public health often differing much in adjoining districts: for example, the public health of St. Saviour's Southwark is worse than the public health of the adjoining parish of St. George-the-Martyr; and the public health of Chelsea is very indifferent, whilst that of the adjoining parishes of St. George Hanover Square and Kensington is comparatively good. The salubrity or insalubrity of a place is estimated by comparing the proportion of persons that annually die out of a certain number of the inhabitants with the number of deaths out of the like number of the living in some other place adopted as a standard of comparison. For the sake of brevity, the proportionate numbers in different places have been called death-rates, a term proposed to be used in this paper. Thus the deaths of the inhabitants of St. Saviour's annually amount to thirty-three in each thousand persons of both sexes and of all ages. The death-rate of St. Saviour's is therefore 33 in the 1,000. The death-rate of St. George the Martyr is thirty; that is to say, out of each thousand of the living 30 persons annually die. The death-rate of Chelsea is twenty-six; that of Kensington, on the one side of it, being only nineteen, and that of St. George's Hanover Square, on the other side of it, eighteen in the thousand. These numbers, which are quoted from the Registrar General's sixteenth annual report, represent the mortality not merely of a single year but of the ten years 1841–50. It is indeed evident that no just comparison could be formed from the experience of a single year. The temporary prevalence of a contagious disease, like scarlet-fever, small-pox, or typhus, might unduly augment the mortality of one district as compared with another in which no similar disease had prevailed. So likewise a visitation of cholera or of influenza, or the occurrence of a hot summer giving rise to an increased mortality from diarrhœa, dysentery, or malarious disease, or of an unusually cold winter proving fatal to many of the ailing, whose lives might otherwise have been indefinitely prolonged, would frequently prevent the mortality of a single year from affording a fair indication of the ordinary mortality. Such discrepancies are avoided by estimating the average annual mortality for a suffi-

Explanation of death-rate.

ciently long series of years, as has been done in the examples quoted from the Registrar General ; for the mortality of healthy and unhealthy seasons is thereby balanced.

The highest death-rate in the kingdom exists in Liverpool, the lowest in Glendale and Rothbury in Northumberland, and Eastbourne in Sussex. Excluding the year 1847, when the Irish famine and fever greatly aggravated the number of deaths in Liverpool, the average annual death-rate of Liverpool has been thirty-six in each thousand inhabitants of all ages and both sexes. The people of the three healthy places only die at the rate of fifteen in the thousand annually.

Registration districts.

England and Wales have been divided into six hundred and twenty-three districts, for the registration of births, marriages, and deaths. Some of these districts consist of towns only ; others are altogether of a rural character. In other cases, whilst a town forms the nucleus or centre, a considerable portion of the surrounding country is likewise comprised within the limits of the registration district. Glendale and Rothbury in Northumberland, and Reeth in Yorkshire, are examples of purely rural registration districts. Leeds, Liverpool, and Hull, are districts altogether of the urban character. York, Ripon, and Tynemouth are registration districts containing the towns of the same names, but each comprising also a considerable rural district. Several of the six hundred and twenty-three districts approach to the insalubrity of Liverpool ; only a few come near the healthfulness of Glendale, Rothbury, and Eastbourne. The average annual death-rate for the whole of England and Wales is twenty-three in the thousand. This average is exceeded in one hundred and two districts. The local mortality coincides with the general mortality in twenty-seven districts. The death-rate falls below the general average in no less that four hundred and ninety-four districts.

Variations of death-rate in different places.

High death-rate of great towns.

The mortality of very few great towns amounts to less than twenty-five in the thousand annually. In most of them it is even higher. The average annual death-loss exceeds twenty-five in the thousand in not less than ninety-six town districts, and in thirty-eight of these it is from twenty-eight to thirty-six in each thousand inhabitants. The average annual mortality does not exceed seventeen in each thousand persons in sixty-four districts. Of course the three healthy places already mentioned, as well as fourteen districts in which the average annual mortality is at the rate of sixteen in the thousand, are included in the sixty-four places here referred to.*

These remarkable differences of death-rate have been continually quoted in support of the many efforts made to ameliorate the public health during the last twenty years. And indeed the fact that only fifteen or sixteen persons out of each thousand of the inhabitants of certain districts annually die, whilst in other places the proportion rises to double or more than double this amount, affords a sufficient reason for investigating the causes of such striking differences and for endeavouring to effect their removal. To say nothing of the great sacrifice of human life and the increase of human suffering in places which have a high death-rate, the loss entailed on the community by excessive sickness, the constant and necessary attendant of a high mortality, and by the deaths of parents prematurely cut off, leaving families to be maintained at the public charge, renders such investigations necessary on economical grounds.

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* Evidence of Dr. Farr, F.R.S., in Report from the Select Committee on the Public Health and Nuisances Removal Bills, 1855, pp. 205–10.

Supposed causes of high death-rates.

As a rule, but a rule that has many remarkable exceptions, the highest rates of mortality occur in towns; the lowest in country places. It has hence been supposed that high death-rates are entirely caused by certain conditions incidental to the aggregation of people in towns, and from which the inhabitants of rural places are comparatively free. The collection of organic and other refuse in the vicinity of human habitations, the close aggregation of buildings, the overcrowding of houses, and an imperfect or an impure water supply, have been almost exclusively considered as the main conditions that have an injurious influence on the public health. Hence legislation and sanitary efforts to improve the public health have had almost exclusive reference to the removal of these very great and evident evils. The drainage and cleansing of towns, the superintendence of buildings, the inspection of dwellings, the regulation of houses used for common-lodging houses, and the provision of a pure and abundant water supply, have hitherto been the beginning and the end of all sanitary exertions. The insalubrity of districts has invariably been attributed to one set of causes. One set of remedies has been empirically recommended in every case.

Want of definite information on the causes of excessive mortality.

No systematic endeavour of which I am cognizant has ever been made to investigate critically the causes of death in unhealthy places, and to refer the diseases which swell the death rolls of such places each to its special cause. Even the kind of diseases which most prevail in unhealthy places is imperfectly understood. Before, however, deciding definitively the nature of the conditions which act injuriously upon the public health, it would seem but natural to inquire what precise effect these conditions have upon the human constitution, what is the nature of the diseases they produce, and whether these diseases, however much they may vary in degree with the greater or less intensity of their causes, are of the like kind in all unhealthy places?

Zymotic diseases commonly considered as the chief causes of excessive mortality.

Just as the excessive mortality of unhealthy towns has, upon inadequate proof, been referred to a few of the more prominent evils consequent upon the aggregation of men into urban communities, so likewise have the diseases that occasion this mortality been hastily inferred from data equally inconclusive. The incongruous class of diseases to which the term zymotic has been applied, is commonly spoken of, even by medical sanitary authorities, in such terms as to convey the impression that it comprises the diseases that are essentially preventable. The term zymotic is indeed often employed almost, if not quite, in the sense of preventable. It cannot indeed be doubted that certain diseases comprised in the zymotic group are, like ague, produced by causes that are in their nature removeable; that others, as cholera and fever, derive at least the conditions of their malignant development from the filthy accumulations common in the neglected portions of large towns; that a third class, which are propagated by contagion, find circumstances favourable for their propagation amidst the crowded population of cities; or, lastly, that contagious and epidemic diseases find a class of persons incapable of successfully battling with illness, amidst the unhealthy and vitally-depressed inhabitants of unhealthy places. But these opinions have never been brought to the test of a sufficiently extensive investigation of facts; and just as I believe there are many causes of district insalubrity which are commonly overlooked by sanitary inquirers, so do I think that it is taking too limited a view of the influence of unwholesome conditions and modes of life to refer their injurious consequences almost exclusively to this single group of diseases.

Reasons for undertaking the Investigation.

We have thus still much to learn, both as to the nature of the particular diseases which produce the excessive mortality of unhealthy places, and of the circumstances under which such diseases arise. It is not impossible that both the diseases themselves and their efficient causes may vary much in different places. The importance of this question was forced upon my attention two years ago. The authorities of St. Thomas's Hospital—actuated, no doubt, by that desire which they have ever manifested to render as perfect as possible the means of education afforded by the medical and surgical college attached to that hospital—determined to found a lectureship on public health. The subject was one which had attracted much notice during several years, and had just at that period gained additional importance from the appointment of medical officers of health for the metropolitan districts, as well as for many provincial towns.

The council of St. Thomas's did me the honour of appointing me to the office; and it was in the preparation of my first course of lectures that I first became fully aware of the vague and imperfect nature of the information upon which the sanitary agitation of the preceding twenty years had been based. To have taught the hasty assertions that had heretofore formed the chief portion of sanitary literature, without being able to support them by evidence; to have descanted only upon the more obvious causes of mischief to the public health that are patent to every observer, would have been utterly to have failed in the performance of the duty I had undertaken. The broad and striking differences of death-loss in different places which had hitherto formed the staple topics of sanitary discussion, however valuable as a means of measuring the condition of the public health, afford no direct information as to the causes that modify it; the unscientific and too often inaccurate information on disease collected by sanitary inquirers, who very frequently have not possessed that special and practical acquaintance with disease and its causes which could alone qualify them for conducting such inquiries, would surely have supplied materials of too unreliable a character to form the basis of a course of lectures addressed to scientific students. Of what use to point to the fact that the inhabitants of large towns often die twice as fast as those of country places, unless the diseases of which they perish, and the causes of those diseases, could likewise be indicated? And such information had never been procured. Public health inquiries had never been systematically extended in this direction. Considering such information essential to the efficiency of my instructions, I felt it necessary personally to undertake its investigation. In the first instance I endeavoured to supply the place of more accurate knowledge by making calculations of the mortality from certain diseases in a limited number of districts for the year 1841, when the number of deaths from each cause in each registration district was published in his annual report by the Registrar General. The results of that limited and most imperfect investigation were so remarkable as to show the necessity for the present more extensive and more careful inquiry. This inquiry was accordingly begun early in the year 1857, but the labour it involved was so great, and the subject grew so much both in importance and dimensions as it progressed, that nearly a year elapsed before its completion. Although the inquiry is very incomplete, and can at most only serve to show the important information that might be obtained from similar but more extended investigations made in conjunction with local inquiries into the circumstances of the several districts, the facts educed from it are far too numerous to be entirely used for the purpose for which they were originally intended. I therefore most gladly agreed to a request made to me by Mr. Simon, that I would communicate the results of the entire inquiry to the General Board of Health, with a view to their official publication.

NATURE OF INVESTIGATION.

My first step in the investigation was the selection of a series of districts which should comprise a variety both of healthy and unhealthy places, each of them distinguished by its position, character, or some peculiarity in the industrial employment of its inhabitants. I next fixed upon the particular diseases which should form the subjects of investigation. It was evident that the chief diseases comprised in the Registrar General's class of zymotic diseases, which have been so commonly referred to as the principal causes of the aggravated mortality of towns, ought to be investigated, in order that the true influence of local circumstances over their spread and intensity might, if possible, be determined. From the result of my previous investigations, diseases dependent upon perverted or imperfect nutrition, under which tubercular affections would be included, ought likewise

Diseases to which the Investigation has extended.

to be comprised in the inquiry. To these two classes of disease were added diseases of the respiratory organs, convulsions, teething, apoplexy, paralysis, rheumatism, carbuncle, and phlegmon. The data required for the inquiry consisting of the unpublished tables of death in the possession of the Registrar General, it was necessary to procure his permission to examine and to make extracts from them. To the Registrar General, Major Graham, and to Dr. Farr, F.R.S., I am indebted, both for the permission to make use of the public papers in their charge, and also for the very courteous manner in which they afforded accommodation in the General Register Office to the gentleman who, under my superintendence, extracted the information necessary to my purpose.*

Period to which the Investigation has reference.

The investigation has extended to one hundred and five registration districts. The number of deaths in each of the seven years 1848–54, from each of the selected diseases and for each sex, was in the first place extracted from the manuscript tables. The period of seven years was chosen because it seemed to afford a sufficiently extensive basis to obviate the fluctuations that are liable to occur from year to year. The particular years were selected because the census of 1851 was taken in the middle year of the term, and it was intended to employ the population of the several districts at the time of the census as the divisors for calculating their death-rates. It is true that some slight inaccuracies of comparison may arise in this mode of dealing with the subject, from the different rates at which the population increases in different places and at different periods. The tendency of such slight inaccuracies will be to diminish the apparent death-rates of urban districts whose population is rapidly increasing, from the immigration of persons at the least fatal period of life, and in comparison to exaggerate the death-rates of country places, whose population augments more slowly, and in consequence of the emigration of young adults often contains an excessive number of the very young and the elderly in whom the mortality is normally large. To have attempted to obviate such inaccuracies by estimating the population of each district for each year would have added immensely to the labour of the inquiry, and after all would but imperfectly have rectified these trifling errors. Whilst, therefore, I cannot claim minute accuracy for the figures contained in the tables which accompany this paper, the results are nevertheless sufficiently near the truth to present a fair comparative view of the differences of death-loss from the particular diseases in the several selected districts.

Manner in which the Investigation has been made.

The number of deaths occasioned in each district during the septennial period by each of the several diseases having been added together separately for each sex, the annual average death-rate of each sex from each disease has been carefully calculated, the population of 1851 being employed as the divisor. In order to afford a correct comparison between the several districts it was necessary to bring the death-rates to one common denomination. To avoid the use of fractions, the death-rates have been calculated in each district for 100,000 persons; for, although it is true very few districts contain 100,000 persons of each sex, and the entire population of most districts falls far short of 100,000, there is no real objection to the adoption of any standard for a comparison of the present kind, provided only the correct proportions be preserved.

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* I could not have made this investigation without help. Several friends have assisted me in it. I beg especially to acknowlege the valuable aid afforded me by Mr. T. A. Welton in the calculation of the death-rates.

Considering that it would be interesting to compare the rate of mortality from the selected diseases in particular places with that of the larger districts in which these places are situated, the inquiry has also been extended to the proportion of deaths produced by the same diseases in England and Wales; in each of the great divisions into which England and Wales have been divided for registration purposes; and in certain counties. The data from which the death-rates of the entire kingdom, of the great divisions, and of the counties have been calculated are taken from the published reports of the Registrar General. The tables containing the results of the investigation are printed in the Appendix, where they appear as Nos. I., II., and III. Immediately underneath the name of the place to which each column of death-rates has reference, certain facts have been placed that will serve to convey a general knowledge of the size and character of the place, and to which a reference will occasionally be necessary in the course of this paper; these facts are, —the number of inhabitants in each district; the average number of persons residing on each square mile; the number of persons in each hundred of the entire population that dwell in towns; the number of paupers to each thousand inhabitants; and the names of the most prevalent industrial occupations. The proportion of paupers for each district has been computed from data supplied by the Poor Law Board to the General Board of Health. The other facts have been procured from the Report of the Census of 1851. For more convenient reference, Table VI., representing the average annual proportion of deaths produced in each district by each of the more important causes, without regard to age or sex, has been prepared and printed in such a form as to show the general results of the inquiry at a single glance.

Circumstances comprised in the investigation.

Several remarkable and unexpected results having been obtained from the first inquiry, for the perfect elucidation of which a more detailed investigation seemed necessary, this was subsequently undertaken for twenty of the districts originally selected. The additional facts thus obtained are the total number of persons of each sex that have died in each of the twenty districts during the seven years 1848–54, and also the number of boys and girls that have died under five years of age during the same period; the number of persons of each sex under five years and above twenty years of age that have died during the same period from diseases of the respiratory organs and from phthisis; the number

Extension of the investigation so as to include some additional facts.

of boys and girls under five years of age that have died from diarrhœa; and the number of men and women aged twenty years and upwards that have died of typhus. From these data have been computed the death-rates comprised in Tables IV. and V. These death-rates represent for each of the twenty districts the average annual proportion of deaths of persons of all ages per 100,000 of each sex; the average annual proportion of deaths per 100,000 children of each sex below the age of five years from all causes, and from each of the several diseases, phthisis, diarrhœa, and "diseases of the respiratory organs;" the average annual proportion of deaths from phthisis and from "diseases of the respiratory organs" in adults above twenty years of age per 100,000 of each sex; and the average annual proportion of deaths from typhus in young persons under twenty years of age, and in adults above twenty years of age per 100,000 of each sex.

Arrangement of tables.

The districts are arranged in alphabetical order in Tables I., II., III., and VI. In Tables IV. and V., and in the smaller tables incorporated in the text, the districts are arranged in series, according to the character of the places and the occupation of their inhabitants. Where several places of similar character, either as regards local circumstances or the occupation of their inhabitants, are contrasted in these smaller tables, they are arranged in the order of their death-rates. The diseases are also arranged somewhat differently in the smaller tables, several diseases being occasionally thrown together to form a group, as in the classes to which I have applied the terms "Nervous diseases of children," which comprises hydrocephalus, convulsions, and teething; and "Pulmonary affections," which includes both the Registrar General's class, "Diseases of the respiratory organs," and phthisis, correctly referred by him to the tubercular class. To facilitate and give greater accuracy to the comparison of different places, the prevalent industrial occupations of districts have been reduced to a uniform standard, showing the proportion of men and women in each hundred persons of either sex aged twenty years and upwards that are engaged in the principal industrial employment of each district.

Investigation imperfect from the absence of local inquiry.

The full significance of the facts brought to light by this investigation can probably only be understood by persons thoroughly conversant with each particular district, and minutely acquainted with the habits of the inhabitants and the circumstances by which they are surrounded. Some even of the more obvious results would unquestionably acquire greater force and distinctness if an investigation were carefully carried out in the places themselves, with the aid of that information which can only be acquired by a personal examination of places and the careful interrogation of their inhabitants. Even in those cases in which the occupation of the inhabitants most evidently appears to exercise a powerful influence over the mortality from certain causes, as in some of the mining districts hereafter referred to, a more analytical investigation made in the district would probably both add strength to the evidence already obtained and perhaps suggest a remedy for the evils that now exist. The less obvious influence of occupation over the public health in other districts may depend upon the mixed character of the industrial employments of the people, rendering it difficult, and, perhaps, without a minute local investigation, impossible, to appreciate the causes which for good or for ill modify the health of the local community. Moreover, the districts most frequently comprise both a variety of smaller districts, sub-districts, as they are called by the Registrar General, and a mixture of the different classes of the community. Some of these sub-districts are occasionally much healthier than others, and this will sometimes depend upon their being the residence of persons who possess all the comforts and advantages of competence.

Pauperism an imperfect measure of poverty.

It is also very doubtful whether the amount of poverty indicated by the proportion of paupers in a population who are in the receipt of parochial relief is to be received as affording an altogether correct indication of the amount of that form of poverty which most affects the public health. Persons receiving parochial relief can scarcely be considered as destitute. Having once accepted such relief, they may be regarded as having abandoned many of the cares and deprivations of the independent poor, and probably with them some of the influences which must injuriously affect health. Hence, fully to appreciate the influence of poverty and its attendant ills, bad food, bad lodging, starvation, and anxiety—and no one practically acquainted with the poor, and conversant with disease, will hesitate to allow that these conditions have great influence over health—it would be necessary to investigate this part of the subject much more analytically than the facts at present before me would admit.

ARRANGEMENT OF SUBJECT.

Having thus indicated the general nature and bearings of the investigation, I now proceed to the consideration of the more important results it has brought to light. Considering the entire subject as barely opened by the inquiry the results of which are embodied in this paper and the tables appended to it, I shall only attempt to explain the facts when they appear, so to speak, to offer their own explanation. And this will best be done by first of all dividing the diseases into classes, and subdividing each of these classes into smaller groups according to either the character of districts or the prevailing industrial employment of their inhabitants. In forming the classes of disease for my present purpose I do not propose to adopt either the arrangement employed by the Registrar General or that of any recognized nosology. All existing arrangements are more or less arbitrary, and the uncertainty which often attaches to the correctness with which the causes of death are registered, renders it necessary to adopt such a division of the subject as will present the facts in the most reliable form. The correct discrimination of chest affections is often a difficult matter, and requires an amount of attention and experience the possession of which cannot always be relied upon. Phthisis, for example, may occasionally be returned under a different name; and other chronic

Reasons for grouping diseases into classes.

Description of classes.

affections of the pulmonary organs are perhaps very often registered as phthisis. For this reason the several diseases grouped together in the class called by the Registrar General "Diseases of the respiratory organs" will, in conjunction with phthisis, form the group to which our attention will first be directed, and which will henceforward be referred to in this paper under the name of "Pulmonary affections;" a term which may be open to objections on scientific grounds, but is sufficiently explicit for the present purpose. The several diseases that belong to the class called "Zymotic diseases" by the Registrar General will form the four following classes, namely: "Contagious diseases," which will comprise small-pox, measles, scarlatina, and hooping-cough; the three profluvial diseases diarrhœa, dysentery, and cholera, to which I shall apply the term "Alvine flux;" "Typhus and erysipelas," being often considered as especially the diseases of unhealthy towns, deserve separate consideration; "Croup, influenza, and ague," notwithstanding their want of any common character, will form the fourth group. The class of "Strumous diseases" will comprise only scrofula and tabes mesenterica, for phthisis has already been referred to the class of pulmonary affections, and hydrocephalus, in conjunction with convulsions and teething, forms a separate class, which I shall name the "Nervous diseases of children." "Apoplexy and paralysis," "Rheumatic fever and rheumatism," and "Carbuncle and phlegmon," will form the three last groups. The several diseases are thus arranged in ten groups; namely,

PRINCIPAL HEADS OF INVESTIGATION.

A. PULMONARY AFFECTIONS.
B. CONTAGIOUS DISEASES.
C. ALVINE FLUX.
D. TYPHUS AND ERYSIPELAS.
E. CROUP, INFLUENZA, AND AGUE.
F. STRUMOUS DISEASES.
G. NERVOUS DISEASES OF CHILDREN.
H. APOPLEXY AND PARALYSIS.
I. RHEUMATIC FEVER AND RHEUMATISM.
K. CARBUNCLE AND PHLEGMON.

A. PULMONARY AFFECTIONS.

A. PULMONARY AFFECTIONS.—This class includes phthisis and the several diseases, viz., laryngitis, bronchitis, pleurisy, pneumonia, asthma, and the diseases of uncertain character registered under the vague term "Disease of lungs, &c.;" which together form the sixth class according to the nomenclature of the Registrar General.* The average annual mortality from pulmonary affections in England and Wales during the seven years 1848-54 was in the proportion of 569 per 100,000 males of all ages and 535 per 100,000 females. Of course both healthy and unhealthy districts are included in the calculation. This general average, as is apparent in the following table, is exceeded in three of the great divisions into which the country has been subdivided for registration purposes. The mortality falls below the general average in the eight remaining divisions.

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* This was written previous to the change made in the classification of the Registrar General at the beginning of the present year.

Table I. *Death-rates from pulmonary affections in the registration divisions of England and Wales.*

Death-rates from Pulmonary Affections in the Registration Divisions of England and Wales.

	Male per 100,000.	Female per 100,000.
London - - -	758	593
North Western Counties - -	694	674
West Midland Counties - -	586	547
ENGLAND AND WALES - -	569	535
Yorkshire - - -	535	523
Monmouthshire and Wales -	526	491
South Western Counties - -	509	459
South Eastern Counties - -	498	475
Eastern Counties - -	489	516
South Midland Counties - -	477	485
Northern Counties - -	469	457
North Midland Counties - -	465	500

Comments on Table I.

There is no uniform relation between the male and female death-rates. The male death-rate is higher than the female in the country generally; but the excess is not large, for if the male death-rate be considered as 100 the female death-rate would be 94. In the London division, which presents the highest male death-rate, the excess of the male death-loss from pulmonary affections over the death-loss of females is in the proportion of 100 to 78.

Industrial employments of women.

The female exceeds the male mortality from pulmonary diseases in the Eastern Counties, the South Midland Counties, and the North Midland Counties. These are among the healthiest divisions in the kingdom; they contain few large towns, and, portions of Nottinghamshire, Leicestershire, Derbyshire, and a small part of Norfolk excepted, a very small proportion of the male inhabitants are employed in manufactures. The female population is, however, largely engaged in manufactures in several of the counties; as in Bedfordshire, where upwards of 33 per cent. of the adult female population are employed in special forms of industrial pursuit and chiefly in the manufacture of straw bonnets, straw plait, and lace; in Buckinghamshire, where 22 per cent. of the adult female population are engaged in industrial pursuits, chiefly in the manufacture of straw plait and lace; and, in Nottinghamshire, where the proportion of adult females engaged in special manufactures exceeds 17 per cent.—hose, lace, gloves, cotton, and silk, in the order here set down, being the subjects of female employment. It is important to remember that the greater portion of these female manufactures are conducted in the homes of the women, the introduction of factories even into some of the towns having been only of comparatively recent origin.

The rate of death-loss from all causes in the Eastern Counties, the South Midland Counties, and the North Midland Counties, as shown in the annexed table, is below that of England and

Wales, and their public health contrasts favourably with the public health of most of the other great Divisions.

TABLE II.
Death-rates from all causes in the registration divisions of England and Wales.

DEATH-RATES from all Causes, 1848–54.

Divisions.	Male per 100,000.	Female per 100,000.
South Eastern Counties - -	2,071	1,960
Eastern Counties - -	2,094	2,024
South Western Counties - -	2,103	1,965
North Midland Counties - -	2,118	2,081
South Midland Counties - -	2,135	2,075
Monmouthshire and Wales -	2,222	2,100
Northern Counties - -	2,299	2,187
ENGLAND AND WALES - -	2,367	2,209
West Midland Counties - -	2,396	2,241
Yorkshire - - -	2,444	2,321
London - - -	2,740	2,353
North Western Counties - -	2,795	2,572

Industrial employments of men.

Agricultural pursuits occupy nearly one-fourth of the adult male inhabitants of Derbyshire, and more than a fourth of those of Nottinghamshire, Middlesex, and Leicestershire, where the agricultural element in the population is the smallest. In Lincolnshire, Rutlandshire, Suffolk, Cambridgeshire, Huntingdonshire, and Bedfordshire, half—in some cases more than half—the adult male population are engaged in the cultivation of the soil; and more than 40 per cent. are similarly employed in the remaining counties, which, together with those already enumerated, form the three divisions. Twenty-six and a half per cent. of the adult male population of England and Wales are employed in agriculture. With the exception of Derbyshire, therefore, the agricultural element very considerably exceeds the general average in each of the counties forming these three divisions. In the subjoined table the proportionate death-loss of the male population from pulmonary diseases in several of the counties comprised in the North Midland and South Midland divisions is placed in juxtaposition with the amount of aggregation of the people upon the surface of the soil, the proportion out of each hundred persons resident in towns, and the number in each hundred adult male inhabitants aged twenty years and upwards who were employed in agricultural and manufacturing pursuits at the time of the last census. It seems to prove that an excess of the urban or the rural, the agricultural or the manufacturing element in the population influences the mortality from pulmonary diseases. Such an influence seems at least apparent when the purely agricultural county of Lincoln is compared with the manufacturing and more densely inhabited counties of Nottingham and Leicester.

TABLE III. *Male pulmonary death-rates of certain Counties, with their population-density, and the proportion of men engaged in agriculture and manufactures.*

Name of County.	Death-rate from Pulmonary Affections per 100,000 Males.	Persons per Square Mile.	Urban Per-centage of Population.	Per-centage of adult Male population engaged in the under-mentioned Occupations.	
				Agriculture.	Manufactures.
Lincoln - -	367	147	26	50·8	1·6
Northampton -	440	216	28	42·1	11·2
Buckingham - -	472	228	37	48·3	4·5
Hertford - -	474	260	24	47·4	2·5
Bedford - -	480	272	30	51·2	3·8
Nottingham - -	488	314	32	27·6	24·9
Cambridge - -	495	215	31	49·9	1·3
Leicester - -	535	283	39	30·0	24·6
ENGLAND AND WALES	569	307	50	26·5	13·7

Comments on Table III.

Buckinghamshire, Hertfordshire, and Bedfordshire, present a striking contrast with Lincolnshire, because they have very nearly as large a number of adult males engaged in the cultivation of the earth, and yet the pulmonary death-rate of each exceeds that of Lincolnshire by more than a fourth. The death-rate of Lincolnshire being considered as 100, the death-rates of the other counties would be as follows:—Buckinghamshire, 128; Hertfordshire, 129; Bedfordshire, 130. The excess of pulmonary death-rate in the latter counties can scarcely be ascribed to any difference of male industrial employment, the manufacturing element in their male population being too insignificant to produce any appreciable effect on the health of the entire male community, and being also much less than exists in the county of Northampton, where the pulmonary death-rate is lower. The high rate of mortality from pulmonary diseases in Cambridgeshire, on the other hand, affords proof that the causes which modify the public health are of a complicated nature, and still require much investigation. The agricultural element in the population of Cambridgeshire is rather larger, the manufacturing element rather less, than in the counties of Buckingham, Hertford, and Bedford; the urban element is intermediate between that of Buckingham and Hertford, and is about the same as that of Bedford; and the density of the population is less than in any of the three. Yet Cambridgeshire sustains a somewhat larger proportionate pulmonary death-loss than either Buckinghamshire, Hertfordshire, or Bedfordshire. It will be hereafter seen that the districts of Whittlesey, North Witchford, and Wisbeach have the same character in this respect with the county in which they are situated.

Female pulmonary death-rates considered in conjunction with the industrial employments of women.

The female pulmonary mortality is less than the male in Hertfordshire; it slightly, but only slightly, exceeds the male in Cambridgeshire, and considerably exceeds it in the other counties. Here it will be interesting to compare the female pulmonary mortality of the several counties now under consideration with the proportion of adult females engaged in special manufactures. In doing this, the ordinary avocations of the sex, as dressmakers, milliners, domestic servants, &c., will not be taken into consideration, as they prevail more or less in every place; but the manufacture of straw bonnets, also a common female occupation everywhere, is in some counties so extensive as to constitute a special manufacture. Allowance being made for the average proportion of women ordinarily employed in this form of industry, it is accordingly added to the special manufactures in counties like Bedfordshire and Hertfordshire, where a large proportion of the female population are employed in the manufacture.

TABLE IV.
Death-rates from pulmonary affections in certain Counties, and proportion of women engaged in manufactures.

Death-rate from Pulmonary Affections per 100,000 Males.	Name of County.	Death-rate from Pulmonary Affections, per 100,000 Females.	Per-centage of Adult Females engaged in Manufactures.
367	Lincoln - - -	401	0·2
440	Northampton - -	468	11·6
472	Buckingham - -	512	22·2
474	Hertford - - -	452	13·5
480	Bedford - -	548	33·2
488	Nottingham - -	549	17·2
495	Cambridge - -	499	0·4
535	Leicester - -	542	17·3

Comments on Table IV.

Bedfordshire.

Buckinghamshire.

Nottinghamshire.

The widest diversities in the male and female mortality occur in Bedfordshire, Nottinghamshire, and Buckinghamshire. In Bedfordshire the difference in the pulmonary mortality of the sexes amounts to 68 per 100,000; in Nottinghamshire to 61; and in Buckinghamshire to 40. In Bedfordshire, where 33 per cent. of the women aged twenty years and upwards are employed in manufacturing pursuits, there does appear to be some direct relation between this circumstance and the death-rate; particularly as upwards of 27 per cent. of the females under twenty years of age are also employed in manufactures. In Buckinghamshire, where a smaller proportion of the female population are employed in special industrial occupations, the diversity in the male and female pulmonary mortality is less. Here also some relation appears to exist between the female mortality and the proportion of females engaged in special kinds of industry; particularly as the proportion of girls employed in manufactures amounts to only 16 per cent. of the female population under twenty years of age. Nottinghamshire, on the other hand, when contrasted with the two other counties, appears at a first glance altogether to vitiate the apparent connexion between the amount of mortality and of female industrial employment. The difference between the male and female death-loss in Nottinghamshire is almost as large as it is in Bedfordshire, whilst the proportion of women employed in manufactures is only half as many as in Bedfordshire and materially less than the number in Buckinghamshire. In Bedfordshire and Buckinghamshire the number of men engaged in manufactures is insignificant. In Nottinghamshire one fourth of the adult male population are so employed. Here then is a case which seems at variance with the conclusion that appeared to spring so evidently from the facts previously recorded. No explanation of the fact is to be gathered from the evidence so far it has hitherto been considered; and as it is my sole intention to state facts, I will not attempt to reconcile the contradiction. Probably the discrepancy will be explicable when the subject shall have been more fully investigated. Perhaps, if the operatives of Nottinghamshire work in factories, and those of Bedfordshire and Buckinghamshire chiefly in their cottages, this may have some influence over the mortality. There may also, perhaps, be something in the nature of the employment; although this is rather contra-indicated by the nearer approach of the male and female death-losses in Leicestershire, where the industrial occupations of the people are nearly identical both in character and proportionate numbers with the industrial employments of Nottinghamshire. Such questions could only be decided by a much more careful and extended investigation than the present.

Absence of uniform relation between the death-rate from pulmonary affections and certain conditions of the people.

Thus, although there does appear to be some general relation between the comparative death-loss of different counties from pulmonary affections, and the closer or more diffused aggregation of their inhabitants, the per-centage of urban population, and the nature of the prevailing industrial employment, this relation is neither constant nor exact. It is indeed evident that there are circumstances which affect the public health that are not discernible, and, as already suggested, these may be partly due to the different manner in which the same kind of labour is carried on in different places. Although less probable in entire counties than in smaller districts where such circumstances unquestionably have much influence, difference of habit, food, or dwelling may possibly be the efficient causes of these remarkable variations. Such discrepancies of death-rates will be much more evident when smaller districts come under consideration; the further examination of the subject may, therefore, be postponed for the present.

Monmouthshire and Wales.

The same want of exact uniformity between the number of persons that perish from pulmonary diseases, and the urban or rural character of a population, is apparent when the pulmonary death-rate of the Welsh division is compared with that of some of the divisions and counties which have just been referred to. The pulmonary death-rate of Monmouthshire and Wales is higher than the pulmonary death-rate in five of the other ten great Registration Divisions; but the urban element and the aggregation of the people on the surface of the soil are less in the Welsh than in any of the other divisions. Two industrial elements, mining and metallic manufactures, enter into the occupations of the people of Monmouthshire and Wales, which scarcely exist in any of the above-mentioned counties. The male pulmonary death-rates of Monmouthshire, North Wales and South Wales, together with the comparative aggregation of the people, so far as this can be shown by the average number of persons living on each square mile, the number of persons in each hundred of the population that live in towns, and the number in each hundred adult males that are employed in agriculture, mining, and metallic and other manufactures, are contrasted in the subjoined table with the same particulars in the agricultural counties of Lincoln and Hereford; in the mining and metal manufacturing counties of Stafford, Durham, and Northumberland; in the mining county of Cornwall; and in England and Wales.

TABLE V.
Male pulmonary Death-rates of certain counties, with their population-density, and the proportion of men engaged in agriculture, mining, and manufactures.

Name of County.	Death-rate from Pulmonary Affection per 100,000 Males.	Persons per Square Mile.	Urban Per-centage of Population.	Per-centage of Male Population aged 20 years and upwards engaged in the under-mentioned occupations.			
				Agriculture.	Mining and Quarrying.	Metal Manufacture.	Other Manufactures.
Lincoln	367	147	26	50·8	·1	1·1	·5
Hereford	444	149	25	54·2	·9	·8	·7
North Wales	471	131	22	43·1	12·6	1·7	3·0
South Wales	543	138	34	31·3	13·9	6·5	1·5
Monmouthshire	587	262	28	20·7	21·4	12·3	·6
Stafford	606	534	55	17·3	14·0	15·9	9·2
Durham	478	349	42	13·7	21·8	5·9	4·3
Northumberland	486	154	49	23·1	11·4	4·8	2·8
Cornwall	533	259	22	32·7	24·8	1·5	·8
ENGLAND and WALES	569	307	50	26·5	4·4	4·4	9·3

Comments on Table v.

If we might draw any conclusion from the facts contained in the table it would clearly be that mining and metallic manufactures are injurious to health, for the counties of Monmouth, Stafford, Durham, and Cornwall sustain a higher pulmonary mortality than the agricultural counties of Lincoln and Hereford. It is indeed true that Staffordshire and Durham possess a larger proportion of urban residents than Lincolnshire and Herefordshire, but on the other hand Cornwall has a smaller proportion.

The mining counties of Cornwall and Durham compared.

The counties of Cornwall and Durham present a remarkable contrast. They are both mining counties, but the former is a copper, tin, and lead mining, the latter a coal and lead mining district. The proportionate number of males engaged in mining in the two counties does not greatly differ. The death-losses of males and females, equal in Durham, differ to the extent of one hundred in each 100,000 persons of either sex in Cornwall; the male death-rate of Cornwall exceeds the male death-rate of Durham in the proportion of 533 to 478; the female death-rate of Durham exceeds the female death-rate of Cornwall in the proportion of 477 to 432. In both counties the proportion of females employed in special occupations is insignificant; but in Cornwall a little under 2½ per cent. of the adult women are employed in mining.

Staffordshire.

The highest death-rates in both sexes occur in Staffordshire, where a certain number of the population are employed in the manufacture of earthenware. The male occupations are of a very mixed kind, and include the manufacture of shoes, silk, and earthenware, as well as the manufacture of metal, coal mining, iron mining, and quarrying. Including 3½ per cent. who are employed in the earthenware manufacture, rather more than 9 per cent. of all the adult women of Staffordshire are engaged in manufacturing pursuits; the remaining 6 per cent. are nailmakers, shoemakers, manufacturers of silk, and a very small proportion are employed in the manufacture of lace, lint, and cotton. The difference between the male and female death-rate is small.

TABLE VI.
Male and female death-rates from pulmonary affections of certain counties.

Name of County.	Death-rates from Pulmonary Diseases.	
	Male per 100,000.	Female per 100,000.
Lincoln - - -	367	401
Hereford - -	444	426
North Wales - -	471	466
South Wales - -	543	491
Monmouth - -	587	554
Stafford - - -	606	591
Durham - -	478	477
Northumberland - -	486	452
Cornwall - - -	533	432
ENGLAND and WALES -	569	535

North-western Counties.

The highest pulmonary mortality exists in the North Western Division, for although the male inhabitants of London perish in a greater proportion than the male inhabitants of the North Western Counties, the mean pulmonary death-rate of both sexes is higher in the latter. Let us now contrast the pulmonary mortality of the male sex in the counties of Lancashire and Cheshire, which constitute the North Western Division, and in the West Riding of Yorkshire, which, together with Lancashire and Cheshire, forms the great manufacturing centre of England, with the mortality in the three agricultural counties of Lincoln, Hereford, and Cambridge, and in England and Wales.

TABLE VII.
Male pulmonary death-rates of certain Counties, with their population-density, and the proportion of men engaged in agriculture, mining, and manufactures.

Name of County.	Death-rate from Pulmonary Affections per 100,000 Males.	Persons per Square Mile.	Urban Per-centage of Population.	Per-centage of adult Male Population engaged in the under-mentioned occupations.				
				Agriculture.	Mining and Quarrying.	Textile Manufactures.	Metal Manufactures.	Other Manufactures.
Lincoln . .	367	147	26	50·8	·1	·2	1·1	·3
Hereford .	444	149	25	54·2	·9	·3	·8	·4
Cambridge .	495	215	31	49·9	·0	·1	·6	·6
Cheshire .	558	391	48	25·4	3·1	15·3	2·6	1·9
West Riding .	577	508	46	15·8	5·2	26·4	8·8	1·4
Lancashire .	722	1,003	66	10·7	4·2	23·3	5·1	2·1
ENGLAND AND WALES .	569	307	50	26·5	4·4	7·1	4·4	2·2

Comments on Table VII.

Here Cheshire contrasts rather favourably with the mortality of England and Wales; but the contrast is only favourable as regards the male sex, for the mean pulmonary mortality of both sexes is higher in Cheshire than in the country generally, and the female pulmonary mortality in Cheshire exceeds the female pulmonary mortality of England and Wales in the proportion of 42 in each hundred thousand females of all ages. These three great manufacturing counties, therefore, present a high mortality from pulmonary affections both in comparison with the three agricultural counties and also with England and Wales. Lancashire presents the highest pulmonary mortality; it has also the smaller proportion of men employed in agriculture. That its high pulmonary mortality is not altogether attributable to the number of persons employed in manufactures is, however, evident from the circumstance that a larger proportion of the male inhabitants of the West Riding than of Lancashire are employed in manufacturing industrial pursuits, and that although the proportion of females employed in manufactures is larger in Lancashire than in the West Riding, the increase does not compensate for the smaller number of males. Lancashire contains the great seaport of Liverpool, which possesses the unenviable position of being one of the unhealthiest places in England and Wales. The mortality from pulmonary diseases is also higher in Liverpool than in any other district to which this investigation has extended. The pulmonary mortality of Lancashire is therefore in some measure augmented by the high pulmonary death-loss of Liverpool; and the high pulmonary death-loss of Liverpool is not at all attributable to the employment of its inhabitants in manufactures, but must be ascribed to some other cause not apparent at present.

Pulmonary death-rates considered in conjunction with nature of industrial employments.

Industrial employments of women.

The female is higher than the male pulmonary mortality in Cheshire; it is also higher than either the male or the female pulmonary mortality in the West Riding. The male mortality exceeds the female mortality both in the West Riding and Lancashire. The proportion of females employed in manufactures is very similar in Cheshire and the West Riding. The proportion in Lancashire is higher than in either Cheshire or the West Riding. The high pulmonary mortality of the female population of Cheshire is very remarkable, and must be presumed to depend upon some special cause. Of the 13·3 per cent. of adult women that are employed in manufactures in Cheshire, 5·4 per cent. are engaged in the silk, and 7·7 per cent. in the cotton manufacture. The proportion of women employed in the silk manufacture in the West Riding is most insignificant; only 2·7 per cent. are employed in the cotton manufacture; 11·0 per cent. are employed in the woollen manufacture. The female inhabitants of the West Riding and Cheshire are therefore engaged in the manufacture of different materials, a circumstance which acquires greater significance from the fact that the female are also higher than the male pulmonary death-rates in Macclesfield and Leek, where the females are likewise much employed in the manufacture of silk. It may indeed be doubted whether the proportion of females employed in this form of industry in Cheshire be sufficiently large to affect the death-rate, supposing the employment to be prejudicial to health, but it was at least desirable to point out the singular coincidence.

Cheshire and the West Riding.

TABLE IX.
Female pulmonary death-rate, with the per-centage of women employed in textile manufactures in Cheshire, West Riding, and Lancashire.

Name of County.	Death-rates from Pulmonary Affections per 100,000 Females.	Per-centage of Adult Female Population employed in Textile Manufactures.
Cheshire - - -	593	13·3
West Riding - -	556	13·8
Lancashire - -	690	18·3

It will be interesting now to compare the pulmonary death-loss of these three counties, Cheshire, the West Riding of Yorkshire, and Lancashire, in which the factory system has received its full development, with the death-loss in the counties of Nottingham and Leicester, where the introduction of large factories is of comparatively recent origin, and a large amount of the industrial employment is still carried on at the houses of the operatives. The pulmonary mortality is less in the counties of Nottingham and Leicester than in any of the other three counties. The female mortality also exceeds the male mortality in both counties. Nottingham, Leicester, and Cheshire nearly agree in several respects, and therefore afford a tolerably fair comparison, which is unequivocally in favour of Nottingham and Leicester.

TABLE X.
Male and female pulmonary death-rates in certain manufacturing counties, with their population-density, and the proportion of men and women engaged in textile manufactures.

Male.				Name of County.	Persons per Square Mile.	Urban Per-centage of Population.	Female.	
Per-centage of adult Male Population engaged in the under-mentioned Occupations.			Death-rate from Pulmonary Affections per 100,000.				Death-Rate from Pulmonary Affections per 100,000.	Per-centage of adult Women engaged in Textile Manufactures.
Agriculture.	Mining and Metal Manufactures.	Textile Manufactures.						
25·4	5·7	15·3	558	Cheshire .	391	48	593	13·3
15·8	14·0	26·4	577	West Riding	508	46	556	13·8
10·7	9·3	23·3	722	Lancashire .	1,003	66	690	18·3
27·6	5·8	21·1	488	Nottingham	314	32	549	16·7
30·0	3·6	22·4	535	Leicester .	283	39	542	17·3

The aggregation of the inhabitants upon the surface of the soil is less dense, and the urban element is proportionably smaller, in Nottingham and Leicester than in Cheshire, but the proportion both of men and women engaged in manufactures is larger than in Cheshire.

Staffordshire and Monmouthshire.

The mortality from pulmonary affections of Staffordshire and Monmouthshire was referred to when the pulmonary death-loss of the great mining districts was under consideration. Both counties present a high mortality. In both the pulmonary death-rate of males exceeds that of females. In Staffordshire the average annual proportion of male deaths from pulmonary affections amounts to 606 for every 100,000 males of all ages; the female deaths amount to 591 for each 100,000 females of all ages. The male pulmonary death-rate of Monmouthshire is 587 per 100,000; the female 554. Those counties in which the people are extensively employed both in mining and in the manufacture of metals lose a larger average number of their inhabitants annually from pulmonary diseases than the purely mining districts, although some kinds of mining, as shown by the wide difference between the male and female mortality in Cornwall, seem to be injurious to health. From this fact it was inferred that the manufacture of metals is injurious to the health of the operatives employed in that form of industry. Let us now, therefore, compare the pulmonary death-rates of the counties of Worcester and Warwick, in which metallic manufactures form the staple occupation of the people, with those of the counties of Stafford and Monmouth, in which mining is associated with metallic manufactures.

Worcestershire and Warwickshire.

TABLE XI. *Male pulmonary death-rates in certain Counties, with their population-density, and the proportion of men employed in metallic manufactures and agriculture.*

Name of County.	Persons per Square Mile.	Urban per-centage of Population.	Death-rate from Pulmonary Affections per 100,000 Males.	Per-centage of Adult Male Population engaged in	
				Agriculture.	Metallic Manufactures.
Stafford - - -	534	55	606	17·3	15·9
Monmouth - -	262	28	587	20·7	12·3
Warwick - -	501	65	650	19·2	17·2
Worcester - -	381	32	511	26·4	13·8

Here Warwickshire sustains the highest male mortality. It has also the largest proportion of its male inhabitants engaged in the manufacture of metals. The manufactures of Warwickshire are of a kind in which the operatives are more exposed to the inhalation of a fine dust than in the coarser manufactures of the other counties. Hence, probably, its higher death-loss from that class of diseases which are known to be excited by the inhalation of irritating substances into the lungs.

The male exceeds the female pulmonary death-rate in all the four counties. The widest difference between the male and female death-rate is in Warwickshire; they approximate the nearest in Staffordshire, where 3·4 per cent. of the adult women are engaged in the manufacture of earthenware.

TABLE XII. *Female pulmonary death-rates, with the proportion of women engaged in metallic and other manufactures in certain counties.*

Name of County.	Death-rate from Pulmonary Affections per 100,000 Females.	Per-centage of Adult Females engaged in	
		Metal Manufactures.	Other Manufactures.
Stafford - - -	591	2·7	5·3
Monmouth - -	554	0·6	0·1
Warwick - -	583	4·0	8·8
Worcester - -	486	5·1	5·6

Warwickshire.

From the wide diversity that exists in the male and female pulmonary death-rates of Warwickshire, a difference twice as great as that in the country at large, and very nearly twice as great as exists in the West Midland division, of which the county of Warwick forms a portion, it is not unfair to assume that the male and female populations are respectively exposed to different conditions which exercise a different influence on health. The influence of the urban element, of the condition of dwellings, and of diet, must be similar in both sexes; the point in which they most obviously differ is the occupation of the adult population; and the different rate at which the sexes perish is no doubt, at least partially, to be ascribed to this circumstance. The facts would probably be much stronger if the mortality were more closely analysed; for the death-losses now described are the death-rates of persons of all ages, and of every station and occupation. A much more analytical investigation would clearly be necessary before any practical suggestions for the sanitary improvement of the operatives engaged in dangerous occupations could be derived from an inquiry of the present kind. It is not unlikely that one result of a more minute investigation would be the discovery that even the same unhealthy occupations produce different degrees of mischief in different places or in different establishments; and that their noxiousness would be much diminished if equal precautions were in general use.

Registration divisions each contain a variety of minor districts of varying character.

The great registration divisions of England and Wales, and the several counties to which our attention has thus far been exclusively directed, each comprise a great variety of districts. Urban and rural, manufacturing and agricultural, healthy and unhealthy places, exist in them all; so that, wide as is the difference between the mortality produced by pulmonary affections in London or the North Western counties as compared with the Northern counties or the South Midland counties, differences still greater are found among the smaller districts into which each of these great divisions is subdivided. There are, as has already been said, three districts in England, the average annual mortality of which from all causes does not exceed 15 in each thousand persons of all ages and of both sexes. There are several districts in which the annual death-rate considerably exceeds 30 in the thousand. But the annual death-rate of the Northern Division, which enjoys the distinction of containing Glendale and Rothbury, two of the three healthiest districts in the kingdom, and which has several other districts of remarkable salubrity, is eleven per cent. higher than the death-rate of the South Eastern Counties, in which Eastbourne, the other healthiest district, is situated; and the death-rate of the North Western Division, which contains Liverpool and Manchester, towns wherein the inhabitants perish at considerably more than twice the rate at which the people of Glendale and Rothbury die, and which also contains several other populous districts wherein the mortality is very nearly double the mortality of the healthiest districts, only exceeds the death-loss of

Mixture of industrial pursuits in divisions and counties masks results.

the Northern counties by twenty-one and a half per cent. In comparing the death-rates of the great divisions or of entire counties, notwithstanding that certain inferences are fairly deducible from the facts, as the danger to health of the tin and copper mining of Cornwall, of the metallic manufactures of Warwickshire and of the mining and manufacturing occupations of Staffordshire, the mixed character of the inhabitants is a circumstance which always more or less complicates the comparison. This source of embarrassment, although not entirely removed, is much diminished when smaller districts are compared with each other; for smaller districts are sometimes exclusively rural or exclusively urban, and, with the exception of occupations which, ministering to the necessities of all populations, are met with everywhere, their inhabitants are often characterised by one prevalent industrial character.

Reasons for selecting a number of smaller districts for investigation.

The hundred and five registration districts now about to be considered were specially selected for investigation on account of their each possessing some peculiar character, either of position, of salubrity, or of occupation; and, although it would have been desirable to have extended the inquiry both to districts which have not been included, and to details which have not been procured, they afford a fair indication of the valuable results that may be expected to follow from a more extended, minute, and careful investigation.

Public health of Liverpool and Glendale contrasted.

Liverpool is the unhealthiest town in England; Glendale is one of the healthiest rural districts. The annual average mortality of Liverpool from all causes is at the rate of 36 in the thousand; the deaths in each thousand of the people of Glendale amount to only 15 annually. The male death-rate of Liverpool for the six years 1849–54 was 38·41: the female 34·96, in each thousand of either sex respectively. The calculation has been made for six years only, because a fraud was discovered in one of the sub-districts for the year 1848 which would have vitiated the result had the deaths of that year been included. The result of this calculation very nearly corresponds with the result of a similar calculation made by the Registrar General for the ten years 1841–50. The male population of Glendale died during the seven years 1848–54 at the annual rate of 15·55, the female population at the rate of 14·66 in the thousand. Glendale and Liverpool occupy, in respect of pulmonary affections, exactly the same relative position they hold in regard to their general death-rates. Of the hundred and five districts to which the present inquiry has extended, Liverpool presents the greatest, Glendale the smallest average annual proportion of deaths by pulmonary diseases. Probably this relation would still be preserved if the pulmonary death-rates of the remaining districts of England and Wales were ascertained. The average annual number of deaths in Glendale from pulmonary diseases are in the proportion of 216 per 100,000 persons of all ages and both sexes. The average annual proportion of deaths from the same diseases in Liverpool amounts to 1,000 per 100,000.

So wide is the gulf between the salubrity of the healthy country district and the insalubrity of the unhealthy city, that, supposing the pulmonary death-rate of Glendale to be 100, that of Liverpool would be represented by 463. The remaining hundred and three districts occupy an intermediate position between these extremes. Few approach very near to the high rate of pulmonary mortality that prevails in Liverpool. Still fewer approximate the healthfulness of Glendale. The latter district, perhaps, presents a standard of health impossible of attainment for the whole kingdom. The former illustrates the great necessity of employing some energetic and well-devised means for improving the public health.

General account of the pulmonary death-rates in 105 *districts.*

Among the hundred and five selected districts, the average annual pulmonary death-rate falls below the proportion of 300 per 100,000 persons of all ages and both sexes in the two districts of Glendale and Easington; is about 300 in Bootle, and between 300 and 400 in Romney Marsh, Houghton-le-Spring, and Haltwhistle. The pulmonary death-rate is between 400 and 500 in twenty-seven districts; between 500 and 600 in thirty-four districts; between 600 and 700 in twenty-three districts; and between 700 and 800 in eleven districts. It exceeds 800 per 100,000 persons of all ages and both sexes in the three unhealthy towns, Liverpool, Manchester, and Bristol. Birmingham, Leeds, Nottingham, Preston, Sheffield, Salford, Wolstanton, and Blackburn stand in the scale of pulmonary insalubrity in the order in which they are here written, immediately below Liverpool, Manchester, and Bristol.

Places in which pulmonary death-rates are highest.

Table XIII. *Average annual pulmonary death-rates in both sexes in the twelve healthiest and the twelve unhealthiest districts.*

Average Annual Pulmonary Death-Rates in both Sexes in the Twelve healthiest and the Twelve unhealthiest Districts.

Districts in which the Pulmonary Death-rate is lowest.			Districts in which the Pulmonary Death-rate is the highest.		
Names of District.	Death-rates.		Names of District.	Death-rates.	
	Male per 100,000.	Female per 100,000.		Male per 100,000.	Female per 100,000.
Glendale . . .	215	218	Liverpool . . .	1,062	939
Easington . . .	222	264	Bristol	979	742
Bootle	277	335	Manchester . . .	905	816
Haltwhistle . . .	328	399	Sheffield	839	670
Cranbrook . . .	342	495	Birmingham . . .	838	699
Romney Marsh . .	362	342	Leeds	817	718
Houghton-le-Spring .	364	394	Nottingham . . .	813	703
Garstang . . .	373	442	Preston	776	768
Builth	395	416	Salford	766	706
Richmond . . .	399	451	Wolstanton . . .	726	727
Leominster . . .	438	386	Blackburn . . .	708	734
Hemel Hempstead .	440	396	Macclesfield . . .	691	804

Comparison of pulmonary death-rates in eight healthy and in eight town districts.

The pulmonary death-rate of England and Wales for the septennial period 1848–54 was 569 in every 100,000 males of all ages, and 535 in each 100,000 females. To obviate minor causes of disturbance, the mean death-rate from pulmonary affections has been calculated for the eight healthy districts, Bootle, Builth, Easington, Garstang, Glendale, Haltwhistle, Houghton-le-Spring, and Romney Marsh. For the purpose of comparison with this, which may be considered as representing, as nearly as possible, the normal death-rate from pulmonary diseases, a similar calculation has been made for the eight urban districts, Liverpool, West Derby, Manchester, Salford, Chorlton, Birmingham, Blackburn, and Leeds. West Derby, Salford, and Chorlton, have been selected in preference to places of still higher insalubrity; the former, on account of its proximity to Liverpool, which it entirely environs on the land side; Salford and Chorlton because of their immediate connexion with Manchester, to which they may be considered as standing in the same position that Westminster and Marylebone do to London. The average annual pulmonary death-rate in the eight healthy districts during the seven years was 322 in each 100,000 persons of both sexes and of all ages. The average annual loss from pulmonary diseases in the eight unhealthy town districts was at the rate of 811 in the 100,000. The mean pulmonary death-rate of the eight urban places is thus more than two and a half times as great as that of the eight rural districts.

TABLE XIV.
Average annual pulmonary death-rates in eight healthy and eight urban districts.

AVERAGE ANNUAL PULMONARY DEATH-RATES for the Eight healthy Districts—Bootle, Builth, Easington, Garstang, Glendale, Haltwhistle, Houghton-le-Spring, and Romney Marsh; and for the Eight urban Districts—Liverpool, West Derby, Manchester, Salford, Chorlton, Birmingham, Blackburn, and Leeds.

———	Per 100,000 Persons of both Sexes.	Per 100,000 Males.	Per 100,000 Females.
Eight healthy districts - -	322	305	340
ENGLAND AND WALES - -	552	569	535
Eight unhealthy districts - -	811	862	764

Comparison of male and female pulmonary death-rates.

The pulmonary mortality of males is rather higher than that of females in England and Wales. The female pulmonary mortality is one-eighth more than that of males in the eight healthy districts; the male mortality being at the rate of 305 and the female at the rate of 340 per 100,0000 persons of each sex respectively. It is just the converse in the eight unhealthy towns, for in them the male pulmonary death-rate exceeds the female by about an eighth. The exact numbers are 862 in each 100,000 males and 764 in each 100,000 females. Thus the insalubrious influences in these towns act most powerfully upon the male population; a circumstance which appears to show that the cause of the unhealthiness of these places does not exclusively consist in the unwholesomeness of dwellings.

Although the female pulmonary mortality exceeds that of males in the eight healthiest districts, the rule is not constant. There are healthy districts in which the male pulmonary mortality exceeds that of females. Bideford and Holsworthy in Devonshire, Aberystwith in Wales, Liskeard in Cornwall, Hendon in Middlesex, and Ulverstone in Lancashire, are healthy districts, the average annual mortality of which, from all causes, is from 16 to 18 out of each 1,000 inhabitants, but in which also the male pulmonary death-rate exceeds that of females.

Table XV. *Healthy districts in which the male exceeds the female pulmonary death-rate.*

Healthy Districts in which the average annual Male Pulmonary Death-rate is higher than the Pulmonary Death-rate of Females.

Name of District.	Death-rates.	
	Male per 100,000.	Female per 100,000.
Bideford - - -	415	353
Hendon - -	434	372
Holsworthy - -	451	426
Ulverston - - -	451	430
Aberystwith - -	491	429
Liskeard - - -	491	432

The excess of the male over the female pulmonary death-rate is as high as one-sixth in Hendon and Bideford, and one-seventh in Aberystwith. So, likewise, notwithstanding that the male pulmonary mortality is so considerably in excess of the female in the eight town districts, there are urban districts, as Bedford, Belper, Chesterfield, Leek, Macclesfield, and Wigan, in which the order is reversed, and the proportion of female deaths very considerably exceeds the proportion of male deaths from pulmonary affections.

Table XVI. *Towns in which the female exceeds the male pulmonary death-rate.*

Towns in which the average annual Female Pulmonary Death-rate is higher than the Pulmonary Death-rate of Males.

Name of District.	Death-rates.	
	Male per 100,000.	Female per 100,000.
Bedford - - -	419	527
Chesterfield - -	456	502
Belper - -	468	558
Leek - - -	588	705
Wigan - - -	598	644
Macclesfield - -	691	804

In Belper and Leek the female pulmonary death-rate exceeds the male by very nearly one-fifth, and in Macclesfield the excess of the female over the male death-rate from affections of the lungs approaches to a sixth. Surely it is not unfair to presume that the causes which have produced such varied results must themselves also be various.

The effect of town influences, although always apparent, is by no means uniform. In illustration of this, let us compare the seaport towns of Hull, Gravesend, and Ipswich, with Bristol.

TABLE XVII. *Pulmonary and general death-rates in four seaports, with their size and population-density.*

Name of District.	Death-rates.		Persons per Square Mile.	Population in 1857.
	Pulmonary Affections per 100,000 Persons.	All Causes per 100,000 Persons.*		
Bristol - - -	851	2,900	22,858	65,716
Ipswich - -	651	2,300	2,497 †	32,759
Gravesend - -	595	2,500	6,908	16,633
Hull - - -	555	3,100	17,750	50,670

* The general death-rates are quoted from the Registrar General's 16th Annual Report, pp. 144–8. The rates being calculated by the Registrar General for 1,000 persons only, cyphers have been added to bring them to the denomination used in this paper.

† The population density of Ipswich is stated to be 250 persons per square mile in the table at p. cxi. vol. I. of the Census Report. This is manifestly an error as the population of Ipswich in 1851 was 32,759, and the district contains only 8,395 acres or rather more than 13 square miles.

Comments on Table XVII.

The pulmonary death rates of Hull, Gravesend, and Ipswich are—Hull, 555; Gravesend, 595; Ipswich, 651; that of Bristol is 851. Next to Liverpool, Bristol is, in respect of pulmonary diseases, the unhealthiest of the hundred and five districts. Supposing the pulmonary death-rate of Glendale to be 100, the pulmonary death-rates of the four towns would stand thus:—Bristol, 396; Ipswich, 301; Gravesend, 275; Hull, 257. The comparatively low mortality of Hull is remarkable, and proves that there exists no fixed relation between the prevalence of pulmonary affections and the size of towns. Hull, exclusive of Sculcoates, contains more than one and a half times as many inhabitants as Ipswich. If, instead of judging of the town element by the number of inhabitants, we test it by the density of their distribution on the surface of the ground, there is still an absence of definite relation between this circumstance and the pulmonary death-rate. The population-density of Bristol being considered as 100, that of Hull would be 77; of Gravesend 30, and of Ipswich only 11. Thus Hull has seven of its inhabitants crowded on to the same space of ground that is occupied by a single individual in Ipswich. Yet Hull contrasts favourably with Ipswich as regards the proportion of deaths from pulmonary affections among its inhabitants, for Ipswich annually loses at the rate of 97 persons per 100,000 more from this class of diseases than Hull.

Want of relation between pulmonary death-rates and the size and population-density of towns.

Absence of relation between the death-rates from pulmonary affections and from all causes.

Neither is there any constant relation between the pulmonary and general death-rates. The pulmonary death-rate of Hull is somewhat less than two-thirds that of Bristol. But according to the Registrar General, the proportion of deaths from all causes is less in Bristol than in Hull, in the ratio of 29 to 31. Ipswich, the general death-rate of which is one-fourth less than the general death-rate of Hull, annually loses at the rate of 97 more persons per 100,000 from pulmonary affections than Hull. In Gravesend, where the general death-rate is to that of Ipswich as 25 to 23, the pulmonary death-rate is less than the pulmonary death-rate of Ipswich.

The same holds true with manufacturing towns. The pulmonary death-rates of Nottingham, Macclesfield, Leicester, and Norwich are,—Nottingham, 753; Macclesfield, 748; Leicester, 697; Norwich, 536 to 100,000 persons of all ages.

Table XVIII. *Pulmonary and general death-rates in four manufacturing towns, with their size and population-density.*

Name of District.	Deaths from Pulmonary Affections per 100,000 Persons.	Deaths from all Causes per 100,000 Persons.*	Persons per Square Mile.	Population in 1857.
Nottingham - -	753	2,600	19,944	58,419
Macclesfield - -	748	2,600	497	63,327
Leicester - -	697	2,700	9,801	60,642
Norwich - -	536	2,400	10,091	68,195

* The general death-rates are quoted from the Registrar General's 16th Annual Report, pp. 144–8. The rates being calculated by the Registrar General for 1,000 persons only, cyphers have been added to bring them to the denomination used in this paper.

Comments on Table XVIII.

The mortality of Glendale from pulmonary diseases being considered as 100, the proportionate mortality of these places would be,—Nottingham, 349; Macclesfield, 346; Leicester, 322; Norwich, 248. The population of these towns does not greatly vary. The smallest of them contains upwards of 58,000 persons, and the population of the largest scarcely exceeds 68,000. The rate of mortality from all causes varies less than in the seaport towns lately under consideration. Nottingham and Macclesfield, which have the highest pulmonary death-rates are, in respect of the mortality from all causes, rather healthier than Leicester. The difference between the pulmonary death-rates of Leicester and Norwich is much greater than the difference of their general death-rates. If the deaths from pulmonary diseases and the deaths from all causes bore a certain relation to each other, then, supposing the pulmonary death-rate of both places and the death-rate of Leicester from all causes to be what they actually are, the general death-rate of Norwich should be only 2,070 per 100,000 instead of 2,400, in order that the pulmonary and general death-rates of Norwich should bear the same relation to each other as do the pulmonary and general death-rates of Leicester. The density of the people of Bristol being considered as 100, that of Nottingham is represented by 87; of Norwich by 44; of Leicester by 43; and of Macclesfield by 2. Thus, although the pulmonary death-rate of Macclesfield is to the pulmonary death-rate of Norwich rather higher than in the proportion of 4 to 3, the inhabitants of Macclesfield have each twenty-two times as much superficial space as the inhabitants of Norwich. It is, indeed, certain that the mode usually adopted of measuring the aggregate distribution of the population by the number of persons on a square mile or an acre fails to afford a true estimate of density in

The proportion of persons to a square mile does not afford a correct estimate *of population-density.*

a sanitary sense. Some town districts have a considerable portion of outlying country district attached to them, which, the density having been calculated for the entire district, of course diminishes the average number of persons on a given space, and yet the urban portion may be very densely populated. Other places, where the labouring classes chiefly dwell in separate cottages, may present a smaller superficial density of population, and yet from deficiency of space within the dwellings their inhabitants may suffer from all the worst evils of an overcrowded population.

Rural districts which have high pulmonary death-rates.

Although the greatest mortality from pulmonary affections is usually found in urban districts, the rule is not without exceptions. Alston, Reeth, Weardale, Saffron Walden, Pateley Bridge, and North Witchford are rural districts, the pulmonary mortality of which equals that of many towns. Bedford, Bideford, Wellingborough, Knaresborough, Spalding, Whittlesey, Lewes, and Wisbeach are town districts that sustain a smaller mortality from pulmonary diseases than any of the country places just enumerated.

Table XIX.
Male and female pulmonary death-rates in several rural and urban districts.

Rural Districts.	Pulmonary Death-rates. Male per 100,000.	Female per 100,000.	Urban Districts.	Pulmonary Death-rates. Male per 100,000.	Female per 100,000.
North Witchford	490	517	Wellingborough	449	531
Pateley Bridge -	508	391	Knaresborough	465	451
Saffron Walden -	520	612	Spalding -	476	478
Weardale -	532	497	Whittlesey -	478	441
Reeth - -	724	528	Lewes - -	482	499
Alston - -	877	494	Wisbeach -	488	498

Comparative mortality of pulmonary diseases in the sexes.

Notwithstanding that the great liability to error in the discrimination of pulmonary diseases for registration purposes has led me to form them into a single group for reference in this paper, I have thought it desirable to show the death-rates of the more important chest affections in the table of district mortality printed in the Appendix. Separate spaces have therefore been allotted in Table III. to diseases of the respiratory organs, to phthisis, and also to pneumonia and bronchitis, which, next to phthisis, are the two most frequent and fatal diseases of the organs of respiration. From these data it appears that phthisis is much more fatal to females than to males, but other pulmonary diseases generally more fatal to males than to females. The mortality from phthisis is higher in males than females in thirty-three districts. Of these districts it is worthy of record that eleven are seaport towns, namely, Portsea Island, Gravesend, Ipswich, Plymouth, East Stonehouse, Stoke Damerel, Bristol, Liverpool, West Derby, Hull, and Newcastle-on-Tyne; six are lead, copper, or tin mining districts, Liskeard, Redruth, Penzance, Pateley Bridge, Alston, and Aberystwith; four, Birmingham,

Phthisis and pulmonary affections.

Phthisis.

Aston, Ecclesall Bierlow, and Sheffield, are places of metallic manufacture; eight are manufactnring towns for textile fabrics, viz., Melksham, Coventry, Leicester, Nottingham, Chorlton, Salford, Manchester, and Leeds; Northampton and Worcester are town districts, the latter remarkable for no particular kind of manufacture in the male, the other for the large number of persons employed in shoemaking; two agricultural districts, Hendon and Builth, complete the list. In seventy-two districts the female mortality from phthisis exceeds the male.

Pulmonary affections.

When, however, not only phthisis but the entire class of pulmonary affections is taken into account, the male exceeds the female mortality in sixty-six districts; in two the male and female mortality are equal, and the female exceeds the male only in thirty-seven districts. Of the thirty-seven places in which the female exceeds the male pulmonary mortality, nineteen are small agricultural towns or rural districts; two, Bedford and Yeovil, are places in which, whilst the male inhabitants are almost exclusively engaged in agricultural pursuits, the females are employed in the manufacture of lace and gloves; two, Easington and Houghton-le-Spring, are coal mining districts; one, Chesterfield, a coal and iron mining district; another, Carnarvon, is inhabited chiefly by slate quarrymen; in Wolstanton many women are employed in the manufacture of earthenware; in Alcester both sexes are employed in the manufacture of needles; in Leek and Macclesfield the silk manufacture employs both male and female operatives; in Wellingborough the men are employed in the manufacture of shoes, the women in the manufacture of lace; Blackburn, Halifax, and Radford are manufacturing; and Basford, Belper, and Wigan are mining and manufacturing districts, in each of which the female population are engaged in manufactures. Pneumonia is more fatal to the male than to the female in ninety-seven districts; bronchitis in seventy-three.

Pneumonia and bronchitis.

Phthisis more fatal to females, acute pulmonary diseases to males.

From these statistics, supposing the causes of death to be returned with only moderate accuracy, it would appear that females are more prone to die of phthisis than males, but that males are more liable to die of acute pulmonary diseases than females. Various disturbing causes seem to be capable of displacing the normal proportion, and of these probably occupations and modes of life are the most influential; but there appears a tendency to the resumption of the normal law wherever, as in manufacturing towns, both sexes are exposed to analogous influences.

Variety in the pulmonary death-rates indicates variety of exciting causes.

The great variety that exits in the proportion of deaths from pulmonary affections in different places, the absence of uniform relation between this mortality and the urban or rural character of districts, and especially the entire want of constant relation in the pulmonary death-rates of the sexes appear to indicate that the excessive amount of pulmonary disease in particular districts is not everywhere attributable to the same cause. It cannot, for example, be the same cause which produces the different proportions of pulmonary death-loss that exists in Liverpool, Alston, Birmingham, Redruth, Hull, Huddersfield, Stroud, Tynemouth, Macclesfield, Wigan, Leek, Chesterfield, Carnarvon, and Basford. In several of these towns the male death-rate from pulmonary diseases very much exceeds that of females; in others the male and female death-rates are equal; in the remainder a greater proportion of females than of males perish from the same number of persons of either sex.

TABLE XX.
Male and female pulmonary death-rates of several districts, with their size, and population-density.

Population in 1851.	Name of District.	Pulmonary Death-rates.		Persons to each House.	Persons per Square Mile.	Per-centage of Urban Popula-tion.
		Male per 100,000.	Female per 100,000.			
258,236	Liverpool . .	1,062	939	6·9	74,416	100
6,816	Alston* . . .	877	494	5·3	125	29
173,951	Birmingham . .	838	699	5·0	41,853	100
53,628	Redruth . . .	670	450	5·1	852	25
50,670	Hull . . .	589	525	5·0	17,750	100
123,860	Huddersfield . .	550	550	5·0	1,191	25
37,386	Stroud . . .	511	511	4·0	547	23
64,248	Tynemouth . .	507	506	5·8	1,035	45
63,327	Macclesfield . .	691	804	4·6	497	62
77,539	Wigan . . .	598	614	5·3	1,055	50
23,031	Leek . . .	588	705	4·8	202	38
45,795	Chesterfield . .	456	502	4·7	309	16
30,446	Carnarvon . .	514	547	4·8	200	23
64,923	Basford . . .	508	577	4·9	472	0

* The small town of Alston contained only 2,005 inhabitants in 1851.

Comments on Table XX.

Some of these towns, as Liverpool, Birmingham, and Hull, are exclusively urban districts; Macclesfield, Wigan, Tynemouth, Leek, Huddersfield, and Carnarvon are partly urban and partly rural districts; Stroud, Redruth, and Chesterfield are districts in which the rural element largely predominates; and Alston and Basford are country places neither of them having any decided urban character. The density of the population measured by the degree of aggregation on the surface of the earth varies in the fourteen districts from upwards of seventy-four thousand on the square mile in Liverpool to only one hundred and twenty-five in Alston. This mode of estimation, as already said, affords a very inadequate measure of the true density of a population. Even the measure of density afforded by the average number of persons to a house does not convey an absolutely correct idea of the real amount of overcrowding in the dwellings of the poorer inhabitants. It, however, may sometimes approximate somewhat nearer to the truth than the mere superficial density, and has, therefore, been calculated for the fourteen places in the table.

Liverpool.

Liverpool, according to this mode of calculating the density of the population, still maintains its position as the most thickly peopled district. With this exception the relative position of the several places in respect of superficial density does not coincide with the comparative density of their inhabitants within doors:

and there is no constant relation between either kind of density and the proportion of deaths from pulmonary affections. Thus Alston, where the inhabitants are the most sparsely distributed on the surface of the country, and which has no decided urban character, stands immediately after Liverpool, Birmingham, and Macclesfield in the scale of pulmonary insalubrity. Its mean death-loss for both sexes exceeds the mean death-loss of Hull by more than one-fifth, although Hull is a purely urban district, and the inhabitants of Hull are packed together so closely, as compared with those of Alston, that one hundred and forty persons in Hull live on the same space of ground that is occupied by one person in Alston. The inhabitants of Tynemouth have one-third less space within doors than the inhabitants of Stroud, and are distributed almost twice as thickly on the surface of the earth. The urban element is also more considerable in Tynemouth than in Stroud, and yet the death-loss of the latter from pulmonary affections is rather greater than the death-loss of the former. Wigan contains three times as many inhabitants as Leek; the inhabitants of Wigan are more crowded in respect of house accommodation than the inhabitants of Leek; twelve per cent. more of the population of Wigan than of the population of Leek, are of the urban class, and each person in the former has only one-fifth of the superficial space enjoyed by each person in the latter; yet the mean annual death-loss of the population of Leek from pulmonary affections is greater in proportion to its numbers than the mean annual death-loss of the inhabitants of Wigan.

Alston.

Hull.

Tynemouth.

Stroud.

Leek and Wigan.

Again, let us contrast the pulmonary death-rate of Macclesfield, Hull, and Huddersfield. The dwellings of Macclesfield are less crowded than the dwellings either of Hull or Huddersfield; the aggregation of the people on the surface of the earth is more than thirty-five times as thick in Hull as in Macclesfield, and more than twice as thick in Huddersfild as in Macclesfield; Hull is altogether an urban district; Macclesfield contains a larger proportion of suburban or rural population; but, nevertheless the annual proportion of the inhabitants of Macclesfield that perishes from pulmonary affections is much larger than that of either Hull or Huddersfield. In these three towns there is, therefore, an entire absence of definite relation between the proportion of deaths from this particular class of diseases, and the more or less urban character of the several places. Let it not be supposed that I desire altogether to ignore the influence of the urban element in the causation of pulmonary affections. I am fully sensible its influence is considerable, and have already said it is always evident; but we must look to other causes as at least largely ancillary to town influences in the production of the very remarkable diversities which have just been enumerated.

Macclesfield, Hull, and Huddersfield.

The great and abnormal difference that so often exists in the male and female pulmonary death-rates of the same place gives additional support to the conclusion that various circumstances

Great difference in the pulmonary death-rates of *the sexes in the same places indicative of variety of causes.*

must concur to produce such various results. Assuming the male death-rate in each district to be 100, the female death-rate in the two series of districts referred to at page 38, the one consisting of eight healthy rural districts, and the other of eight unhealthy urban places, would in the former be represented by 111·4, and in the latter by 88·6. These are, however, by no means the extremes of difference in the proportionate mortality of the sexes.

Examples.

The male pulmonary death-rate in Alston being represented by 100, the female would be only 56·3. Alston is the district in which the variation is greatest in the direction of a low female death-rate, as compared with the male death-rate of the same place. Cranbrook, Newport Pagnell, Bedford, and Haltwhistle represent the other extremity of the scale in which the female pulmonary mortality greatly exceeds the male. The male death-rate for a given number of males of all ages in each of these places being considered as 100, the female mortality among the same number of females would be, Cranbrook 144·7, Newport Pagnell 126·7, Bedford 125·7, Haltwhistle 121·6. The following table shows the comparative proportions of the male and female death-rate from pulmonary diseases in the several places that have here been referred to, the male death-rate in each case being represented by 100:—

TABLE XXI.
The comparative proportions of the male and female pulmonary death-rate in several places.

	Male.	Female.		Male.	Female.
Cranbrook . . .	100	144	Huddersfield . . .	100	100
Newport Pagnell .	100	126	Stroud	100	100
Bedford . . .	100	125	Tynemouth . . .	100	99
Haltwhistle . .	100	121	ENGLAND AND WALES .	100	94
Leek	100	119	Hull	100	89
Macclesfield . .	100	116	Liverpool . . .	100	88
Basford . . .	100	113	Birmingham . . .	100	83
Chesterfield . .	100	110	Sheffield	100	79
Wigan . . .	100	107	Redruth	100	67
Carnarvon . . .	100	106	Alston	100	56

Absence of constant relation between the number of deaths from all causes and from pulmonary affections.

The number of persons that perish from pulmonary diseases bears no constant relation to the number of persons that perish from all causes; but the proportion varies in different places. In healthy places the deaths from pulmonary affections form only from ten or twelve to twenty per cent. of the gross mortality; in unhealthy places from twenty to twenty-seven per cent., and in some of the metal mining districts, in the male sex, from thirty to forty per cent. To illustrate this I have calculated the proportion of deaths from pulmonary affections to the total number of deaths in each sex for the septennial period 1848–54 in twenty districts. Some of these districts are amongst the healthiest, others amonst the unhealthiest in the kingdom, and the series includes both large towns and rural districts.

TABLE XXII.
Per-centage of deaths from pulmonary affections in the total mortality of several districts.

Name of District.	Per-centage of Mortality produced by Pulmonary Affections.		Name of District.	Per-centage of Mortality produced by Pulmonary Affections.	
	In each 100 Male Deaths.	In each 100 Female Deaths.		In each 100 Male Deaths.	In each 100 Female Deaths.
Easington . . .	10·3	13·2	New Forest . . .	22·8	23·5
Glendale . . .	12·2	12·7	Manchester . . .	24·0	27·4
Houghton-le-Spring .	14·9	17·2	Wolstanton . . .	24·7	24·3
Haltwhistle . . .	16·9	19·4	Liverpool . . .	25·6	24·2
Hull	16·9	15·8	Redruth . . .	27·0	19·8
Towcester . . .	19·0	20·6	Birmingham . . .	27·3	24·7
Carnarvon . . .	20·0	20·7	Bristol	27·6	25·1
Wolverhampton . .	20·4	21·5	Reeth	33·3	24·1
Leek	22·2	23·7	Alston	40·2	25·4
Macclesfield . . .	22·6	25·4	ENGLAND AND WALES .	24·0	24·2
Leeds	22·8	21·4			

Comments on Table XXII.

From this calculation it appears that whilst the deaths from pulmonary affections form nearly one-fourth of the gross mortality in England and Wales, there are districts in which the proportion is as low as a seventh or an eighth; and, exclusive of the exceptional mining districts, Redruth, Reeth, and Alston, others in which it exceeds a fourth of the entire death-loss. Whilst only 12 deaths in each 100 are referable to affections of the chest in Glendale, upwards of 24 out of every 100 deaths are produced by pulmonary diseases in Manchester, Wolstanton, and Liverpool. The proportion is even higher in Birmingham and Bristol. That these proportions bear no direct relation to the general death-rate is clear, because, whilst the average annual death-rates of Glendale, Haltwhistle, and New Forest are, Glendale 15, Haltwhistle 16, and New Forest 17 in each 1,000 persons, the mortality from pulmonary affections forms 12 per cent. of the gross mortality in Glendale, 18 per cent. in Haltwhistle, and 23 per cent. in New Forest. The inhabitants of Hull perish at the rate of 30 in each 1,000 annually, but of this number only 16 per cent. die of pulmonary diseases. In Wolverhampton, where the general death-loss is a little below that of Hull, upwards of 20 per cent. of all the deaths are produced by pulmonary affections. In Leeds, the general death-loss of which is rather higher than the general death-loss of Hull, 22 per cent. of all who die perish from pulmonary diseases.

It is thus evident that we must inquire further before we can hope to refer the remarkable variations in the rates of death from pulmonary affections in different districts to their true causes. The striking variations that exist in the proportionate mortality of the sexes who are domiciled in the same manner and partake of the same kind of food rather indicates the existence of causes to which males and females are exposed in different degrees. And in fact, men and women, and to a more limited extent boys and girls, even when living in the same house, and partaking of the same diet, are frequently exposed to noxious influences of dissimilar character. Men usually spend a considerable portion of the day from home, and thus breathe, for at least several hours daily, an atmosphere often very different in respect of purity from that inhaled by the other members of their family. The man's occupation may be active or sedentary; carried on in the dark mine underground; in a stifling workshop rendered unwholesome by a high artificial temperature, or the crowding of too many operatives into a limited space; in the dusty atmosphere of a factory; or in the pure air of Heaven. There are great varieties in all these respects; some open-air employments, such as those in which quarrymen are engaged, are attended by the inhalation of an atmosphere dangerous to health. A well ventilated coal mine, or a well-ordered factory or workshop, may, and frequently does, possess a perfectly pure and wholesome atmosphere. Again, the workman may be liable to inhale noxious vapours or mechanical particles which irritate the delicate pulmonary mucous membrane, and induce disease, which sooner or later proves fatal, unless the employment be abandoned; or he may be exposed to cold and damp; or to an elevated temperature and too dry an atmosphere; one or more of which circumstances may most seriously impair his health, that of his family remaining uninjured. The wife and younger children on the other hand, bear the full brunt of any home defects. Being less absent than her husband, the wife suffers proportionably more than him if their residence be unhealthy, either from defective construction or its location in an unhealthy neighbourhood. Neither are women always exempt from certain causes of pulmonary disease incidental to particular industrial pursuits. Women are extensively employed in factories in most manufacturing towns. They are also frequently engaged in shoemaking, nail-making, or as manufacturers of needles, lace, gloves, or straw plait. Sometimes, although rarely, they are miners. Even needlework, which is especially a female occupation, as now conducted in the metropolis and other large towns, is a most frequent cause of illness and death to the unfortunate needle-women.

Men and women exposed to very different influences.

It might, *à priori*, have been expected that these several circumstances would have considerable influence over the comparative mortality from pulmonary affections in the sexes, and in places of different industrial character. And, in fact, as I now proceed to demonstrate, the influence of industrial employment on the liability of a population to suffer from pulmonary diseases is very clearly brought out by my inquiry. For this purpose it will be convenient to divide the districts into classes, each representing a particular form of industrial employment. It must not, however, be forgotten, that, on the one hand, there are con-

Further subdivision of subject according to the particular industrial occupations of different districts.

siderable sections of every community that are free from the influence of the prevailing occupation, and, on the other, that there are certain occupations which are pursued everywhere, although it is true the proportion of persons engaged in them varies somewhat in different places. Thus, among the several agricultural districts that are comprised in my investigation, the proportion of adult men engaged in agriculture rarely exceeds 50 per cent. of the adult male population; in only five districts is it above 60, and in Holsworthy alone does it attain 70 per cent. In the single mining district of Alston the miners form 59 per cent. of the adult male population; in Redruth only 54 per cent., and in Easington only 50 per cent. of the men are employed in the mines. At Merthyr Tydfil and Abergavenny, where metal manufactures are combined with mining, the proportion of men employed in the three occupations, coal mining, iron mining, and iron manufacture, in each place, forms less than 55 per cent. of the adult male population. In Sheffield and Ecclesall Bierlow, which are essentially places of metallic manufacture, the adult males engaged in the various kinds of metal manufacture carried on in those districts amounts to only 41 per cent. of the adult men in Sheffield, and to 44 per cent. in Ecclesall. In none of the towns that are the most exclusively devoted to textile manufactures does the proportion of adult males employed in the special manufacture of the place amount to 50 per cent. of the resident adult male population. The remainder of the adult men in each place are employed in pursuits which minister to the necessities or the luxuries of the prevalent class. This circumstance of course masks to a certain extent the influence of its peculiar form of industry upon the public health of the district, but in so doing it does not invalidate certain conclusions that evidently spring from the facts elicited by this inquiry.

Classification of districts according to industrial employment of their inhabitants.

The following divisions comprise the chief industrial occupations of the several districts; namely,

1. Agricultural.
2. Commerce and Maritime Pursuits.
3. Mining.
4. Manufacture of Metals.
5. Manufacture of Earthenware.
6. Manufacture of Textile Fabrics.
7. Manufacture of Shoes.

1. Agriculture.

1. Agriculture.—The agricultural districts consist (a) of purely rural places, as Glendale, Bootle, Cranbrook, and Hendon; (b) of districts which contain small towns the inhabitants of which are employed either in agricultural pursuits, or in occupations which minister to the requirements of an agricultural population, as Whittlesey, Spalding, Lewes, and Farnham; and (c) of districts, sometimes exclusively rural, sometimes partially urban, the female population of which follow some special industrial employment, as the manufacture of lace, gloves, straw plait, or straw bonnets, as Newport Pagnell, Hemel Hempstead, and Luton.

(a) Rural places.

(a) *Rural Places.*—The death-loss from pulmonary affections in purely agricultural districts, that is, in places where there is no town, and agriculture is the principal occupation of the inhabitants, varies from the rate of 216 per 100,000 persons in Glendale to that of 473 per 100,000 persons in New Forest. The pulmonary death-rate of England and Wales, without regard to age or sex, is 552; therefore the death-rate from this class of complaints in the several country places is considerably below that of the country at large. The subjoined table shows the pulmonary death-rates of each sex in each of the purely agricultural districts; the proportionate aggregation of the population on the surface of the earth and in houses; the number in each 100 adult males that are engaged in agriculture; and the number of persons in each 1,000 of the entire population that are recipients of parochial relief.

TABLE XXIII. *Male and female pulmonary death-rates in rural districts, with the proportion of paupers, the population-density, and the proportion of men employed in agriculture.*

Name of District.	Death-rates from Pulmonary Affections.		Per-centage of Adult Males engaged in Agriculture.	Proportion of Paupers per 1,000 Persons.	Persons to a Square Mile.	Persons to a House.
	Male per 100,000.	Female per 100,000.				
Glendale	215	218	57·1	53	65	5·1
Bootle	277	335	64·2	27	38	5·6
Cranbrook	342	495	60·2	92	208	5·0
Romney Marsh	362	342	59·0	57	74	5·2
Blofield	376	492	59·4	68	168	5·0
Builth	395	416	68·2	96	52	5·1
New Forest	425	521	48·8	73	101	5·1
Hendon	434	372	38·0	40	308	5·6
ENGLAND AND WALES	569	535	26·5	—	307	5·5

Low pulmonary death-rates of several northern districts.

The most remarkable fact in the Table is the very much smaller mortality of Glendale in Northumberland and of Bootle in Cumberland, than of even the healthiest places in the south of England; a peculiarity which is not confined to these agricultural places, but is also observed in Haltwhistle, Easington, and Houghton-le-Spring, the inhabitants of the former of which places are partially and of the two latter extensively employed in coal mining. The facts are too few to allow of any general inference, but they at least prove that the colder and more variable climate of that narrow part of the island that intervenes between the Solway Firth and the North Sea is not unfavourable to health, and that cold alone is less causative of pulmonary diseases than is commonly supposed. Let me not here, however, be misunderstood. I do not mean to assert that cold and atmospheric vicissitudes are not among the most powerful *exciting* causes of pulmonary diseases in the delicate or the predisposed; I only mean to infer, that, apart from personal predisposition, they are much less dangerous than is usually believed. Perhaps the clearer atmosphere and the comparative infrequency of fogs in this northern portion of England may be among the causes of the smaller comparative mortality from pulmonary affections.

Excess of female pulmonary death-rate in several districts.

The differences of death-rate in the sexes are very striking. The female is higher than the male pulmonary death-rate in all the districts, excepting Romney Marsh and Hendon. The female very largely exceeds the male death-rate in Cranbrook, Blofield, and New Forest. Even if we admit, as we probably must, that the death-loss from pulmonary diseases is normally higher in females than in males, the excess in these places is very much greater than the normal proportion. This fact seems to show that there is some injurious influence in the habits or the dwellings of these districts to which women are exposed in a greater degree than men; a supposition rather supported by an analysis of the mortality from all causes sustained by the inhabitants of New Forest at different ages. The proportion of deaths from all causes in the male for the whole of life almost invariably exceeds the proportion ,in the female; but of the twenty districts that have been more minutely analyzed for the purpose of this inquiry, the female death-rate from all causes and at all ages is higher than the male in New Forest and three other places. The average annual male death-rate of New Forest from all causes for the septennial period 1848-54 was 1,701; the average annual female death-rate was 1,764 per 100,000 of each sex respectively. Male children in this country naturally die at a more rapid rate than female children. The annual death-rate of boys under five years of age in New Forest exceeded the death-rate of girls of the same age in about the normal proportion. Young children of both sexes are usually exposed to the same external influences as the women of the same place. We might, therefore, expect that if the latter be exposed to any particular injurious conditions in which the children participate, the death-rates of boys and girls would, as actually happens in New Forest, preserve their normal proportions. It, is, however, most remarkable, that, whilst the ordinary proportion is maintained as regards the deaths of boys and girls from all causes, the girls in New Forest die much more largely from pulmonary diseases than the boys. In this respect New Forest is, so far as my investigation shows, an exceptional case, for, with the exception of Wolverhampton and Leek, where the pulmonary mortality of female children under five years of age slightly exceeds that of male children of the same age, the pulmonary death-loss of boys in the remaining nineteen towns exceeds that of girls. This peculiarity is the more striking, because the nervous diseases of children, a class of diseases which specially appertain to early life, and the excess or smallness of whose mortality affords, as will hereafter appear, a tolerably fair indication of the healthfulness or the unhealthiness of places, are fatal to the children of New Forest in the normal proportion. These facts are shown side by side in the annexed table.

Death-rates of children in New Forest.

TABLE XXIV. *Death-rates of New Forest at different ages.*

Death-rates from all Causes.				Death-rates from Pulmonary Affections.						Death-rates from Nervous Diseases of Children.	
At all Ages.		Under 5 Years.		At all Ages.		Under 5 Years.		Above 20 Years.			
Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
1,701	1,764	3,740	3,502	425	521	461	765	625	661	145	110

Comments on Table XXIV.

It may indeed occur to others, as it did to myself, that the population of New Forest is small, and the deaths too few to admit of any fair and reliable conclusions being deduced from them. A closer and more critical examination of the facts, however, shows that the data upon which the comparison is founded are really more trustworthy than might have been supposed. The population of New Forest in 1851 was 13,540, whereof 6,794 were males, and 6,746 were females; of these 928 were boys and 934 were girls under five years of age. The population increased at the rate of only 2·2 per cent. for the decennial period between 1841 and 1851. The deaths from pulmonary diseases in the two sexes preserved their relative proportions from year to year much more nearly than might have been anticipated. The small disturbance caused by changes in the number of the inhabitants, and by fluctuations of mortality, added to the circumstance that the death rates represent an average for seven years, and that male and female children perished in about the normal proportion from all causes and from nervous infantile diseases, all have a tendency to lessen any doubts that may be entertained of the reliability of the statistics on account of the comparatively small number of facts upon which they are based. Absurd as it may seem, on a cursory consideration, to calculate the death-rates of a district in which neither the male nor the female population quite reaches 7,000, to a standard of 100,000, it must not be forgotten that this has been done for the convenience of comparing the mortality of the different places comprised in the inquiry, and to avoid fractions. The relative proportions are still maintained, if the two left-hand figures be struck off, so as to reduce the death-rates to the proportion out of 1,000 instead of 100,000 persons. If this be done, the general death-rate is brought into exact accordance with the result of the Registrar General's calculation for the ten years 1841–50 thus affording a confirmation of the correctness of the results of the present calculation.

High male pulmonary death-rate of Hendon.

The excess of the male death-rate in Hendon is proportionably much greater than the average excess in England and Wales, wherein the male pulmonary death-rate is also greater than the female. It would be difficult, indeed, from the present data impossible, to reconcile the remarkable variations in the pulmonary mortality shown in the table. Perhaps the high male death-rate of Hendon from pulmonary diseases may be partly accounted for by the agricultural peculiarity of the district. Hendon includes that great hay-growing country which lies between London and Harrow, and the occupation of its population differs materially from that of the agricultural inhabitants of most rural places. Most of the agricultural labourers are employed either as hay binders or cartmen. The duty of the former consists chiefly in cutting hay from the stack, and binding it into trusses for the London market. The principal occupation of the latter is to convey the hay to market. Labourers constantly employed in the former duty are, like chaff cutters, exposed to inhale an irritating dust which excites pulmonary disease, and the cartmen, on the other hand, who spend a large portion of their time on the road and at market, are exposed to several obvious causes of ill-health. Whether this be or be not the correct explanation in this particular case, it is at least quite certain that, although agricultural labour is much healthier than most other employments, yet every branch of agricultural labour is not equally healthful.

Absence of relation between death-rate, pauperism, and density of population.

No very obvious inference can be drawn from the other facts shown in the table, excepting that the mortality is not in direct proportion either to the proportion of paupers in a population, the average number of persons resident on a square mile, or the average number of persons dwelling in each house. Probably both the amount of privation and of overcrowding of houses have an influence on the pulmonary mortality; but, on the one hand, the excess of one may compensate for the smallness of the other in some of the places, and, on the other hand, neither the real amount of privation nor of overcrowding is accurately represented by the facts at present before us.

(b) *Urban agricultural districts.*

(b) *Urban Agricultural Districts.*—The mean pulmonary mortality in the ten urban districts shown in the annexed table varies from 384 per 100,000 persons of all ages and both sexes in Bideford to 566 in Saffron Walden.

TABLE XXV. *Male and female pulmonary death-rates in urban agricultural districts, the proportion of paupers, of men employed in agriculture, and the population-density.*

Name of District.	Death-Rates from Pulmonary Affections.		Urban Percentage of Population.	Percentage of Adult Males engaged in Agriculture.	Proportion of Paupers per 1,000 Persons.	Persons to a Square Mile.	Persons to a House.
	Male per 100,000.	Female per 100,000.					
Richmond (Yorks.) .	399	451	29	46·4	44	113	4·7
Bideford . . .	415	353	29	44·7	68	171	5·1
Leominster . .	438	386	34	54·4	68	145	4·7
Spalding . . .	476	478	36	56·0	50	194	4·8
Whittlesey . .	478	441	71	58·0	57	196	4·5
Lewes . . .	482	499	37	44·7	28	193	5·4
Wisbeach . .	488	498	35	50·9	78	176	4·7
Farnham . .	488	538	29	49·8	59	241	5·1
North Witchford .	490	517	25	60·4	56	174	4·8
Saffron Walden .	520	612	28	55·9	103	212	4·4
ENGLAND AND WALES	569	535	50	26·5	—	307	5·5

Comments on Table XXV.

The male exceeds the female death-rate in Bideford, Leominster, and Whittlesey; the female exceeds the male death-rate in the remaining places. The mean death-rate of both sexes in several of these small rural towns is below the mean death-rate of both sexes in several of the rural districts lately under consideration. There is also no uniform relation between the pulmonary death-rates and the other peculiarities of the several towns. If, fo example, Richmond in Yorkshire and Bideford be compared with North Witchford and Farnham, the contrast is favourable to the former, adverse to the latter districts. The four places are in several respects nearly alike, but the people of Farnham are more densely aggregated on the surface of the earth than those of any of the other districts. Bideford and Farnham exactly agree, and Richmond and North Witchford nearly agree, in the average proportion of inmates to each house. A larger proportion of the men of Farnham and North Witchford than of those of Richmond and Bideford are employed in the cultivation of the soil. The proportion of urban residents, equal in Richmond, Bideford, and Farnham, is a little smaller in North Witchford. Bideford has a larger proportion, Richmond a much smaller proportion of its inhabitants in the receipt of parochial relief than either North Witchford or Farnham. Yet, if the pulmonary death-rate of each sex in Richmond be considered as 100, the pulmonary death-rates of the other places would be, Bideford, male 104, female 74; Farnham, male 122, female 119; North Witchford, male 122, female 114. Again, Farnham and Saffron Walden also present a remarkable contrast. The mean pulmonary death-rate of Saffron Walden exceeds the mean pulmonary death-rate of Farnham in the proportion of 53 to 100,000 persons. The inhabitants of Farnham are more closely packed within-doors, and more closely aggregated on the surface of the earth than those of Saffron Walden. The proportion of urban residents is slightly higher in Farnham, and the proportion of the male inhabitants engaged in the cultivation of the soil rather smaller, than in Saffron Walden; but whilst more than one-tenth of the inhabitants of Saffron Walden are on the roll of paupers, only one seventeenth of those of Farnham are recipients of parochial relief. Saffron Walden, estimated by the amount of its pulmonary mortality, is by far the unhealthiest of the rural towns at present under consideration. Although the death-rates of the sexes are reversed, the female pulmonary death-rate in Saffron Walden being greatly in excess of the male, the pulmonary death-rate irrespective of sex does not differ greatly from the pulmonary death-rate of England and Wales, the comparison being, however, rather favourable to England and Wales, and adverse to Saffron Walden. If the amount of pauperage be a true indication of the amount of poverty, Saffron Walden is the most poverty-stricken of the hundred and five districts included in the inquiry. Perhaps it is to this circumstance, and its attendant evils, that the high pulmonary death-loss of the district is to be ascribed.

There is one feature in many of these rural towns that ought not to be forgotten in such comparisons as the present, particularly as it is a feature which does not appear in the tables, and could only be estimated by persons intimately acquainted with the places themselves. It is, that small country towns, such as Richmond, Lewes, and Farnham, often afford a desirable residence for persons of independent means, who are uninfluenced by many of the conditions injurious to the health of the population amidst which they dwell. It is evident that the residence of a considerable number of persons of this class in any district will tend to diminish the proportion of paupers in the general population, to diminish the proportion of persons engaged in agricultural pursuits, and to add to the proportion of urban residents. It is well here to refer to the fact, because it is probably a cause of disturbance which aids at least in preventing more accurate deductions from the facts at present before us.

(c) *Agricultural districts in which the women are engaged in manufactures.*

(c) *Districts in which the females alone are engaged in manufactures.*—In the several agricultural districts and towns which have thus far occupied our attention, the female population are almost exclusively employed in the ordinary social and domestic duties of their sex. In those to which our attention must now be directed the male are still mainly employed in the cultivation of the earth, but the females are engaged in manufactures special to each place.

TABLE XXV. *Male and female pulmonary death-rates in agricultural districts where the women are engaged in manufactures, with the population-density, and the proportion of paupers of men engaged in agriculture, and of women in industrial employments.*

Male.			Name of District.	Female.		Urban Per-centage of Population.	Proportion of Paupers per 1,000 Persons.	Persons to a Square Mile.
Per-centage of adult Men engaged in		Death-Rate from Pulmonary Affections per 100,000.		Death-Rate from Pulmonary Affections per 100,000.	Per-centage of adult Women engaged in Manufactures.			
Manufactures.	Agriculture.							
	44·7	415	Bideford* . .	353	3·9 *a*	29	68	171
	48·6	419	Bedford . .	527	25·3 *b*	33	61	234
	52·3	430	Newport Pagnell	545	33·3 *b*	14	88	215
	70·9	451	Holsworthy .	426	3·7 *a*	0	69	84
	41·5	457	Wycombe† . .	535	22·6 *b*	30	82	264
	49·5	475	Towcester . .	573	26·7 *b*	19	67	194
4·4 *c*	63·5	373	Garstang . .	442	7·2 *c*	0	59	130
2·6 *d*	40·7	440	Hemel Hempstead	396	26·1 *d*	20	64	330
6·2 *d*	53·1	464	Leighton Buzzard	479	37·6 *d*	26	51	289
2·6 *d*	40·2	491	Berkhampstead .	566	28·9 *d*	49	49	326
8·2 *a*	35·0	528	Yeovil‡ . .	591	29·0 *a*	28	69	249
4·5 *e*	38·9	558	Luton . . .	537	59·7 *e*	56	39	393
13·7	26·5	569	ENGLAND AND WALES . .	535	7·2	50	—	307

a Gloves. *b* Lace. *c* Cotton. *d* Straw-plait. *e* Straw-bonnets.

* Bideford contains also 7·2 per cent. of seamen and 2·6 per cent. of shipwrights amongst its adult men (aged 20 years and upwards).

† Wycombe 11·0 per cent. of the adult male population are chairmakers and sawyers, and 3·3 per cent. paper manufacturers. A small number of females are also employed in the manufacture of paper.

‡ Yeovil. 3·6 per cent. of the men are sail-cloth manufacturers.

Comments on Table XXV.

Amongst the districts in the table are several from which no certain conclusion can be deduced. Bideford, Holsworthy, and Garstang are placed here because a very small proportion of their female inhabitants are employed in manufactures. Excluding these three places, a considerable proportion of the women are engaged in special manufactures in the remaining districts, and in all of them, excepting Hemel Hempstead and Luton, the female mortality is higher than the male. The female exceeds the male death-rate most largely in the four lace-making districts, Newport Pagnell, Bedford, Towcester, and Wycombe, in the order in which they are here written ; and save that the proportion of women employed in the manufacture of lace in Bedford and Towcester is about the same, the excess of the female death-rate in each place agrees almost exactly with the proportion of females engaged in this form of industry. With the exception of Wycombe, where rather more than a tenth of the men are employed in carpentry, the male inhabitants of these places are chiefly employed in agricultural operations. Of the four lace-making districts the rate of mortality is highest in Towcester, where the population is least dense and the pauperism moderate ; lowest in Bedford, where the proportion of urban residents is largest.

Influence of lace-making on health.

That the employment of women in the manufacture of lace really has an influence on health is supported by the fact that the excess of the death-rate from pulmonary affections in the adult women of Towcester above the death-rate of men is very nearly twice as high as the excess for the whole of life. Moreover, children perish in an undue proportion during the first years of life, both from all causes and from affections of the chest ; but the death-rate of male children, both from all causes and from pulmonary diseases, is higher than the death-rate of female children by about what must be considered as the normal amount.

TABLE XXVI. *Death-rates from all causes and from pulmonary affections at different ages in Towcester, New Forest, and Glendale.*

Name of District.	Death-rates from all Causes.				Death-rates from Pulmonary Affections.					
	At all Ages.		Under 5 Years.		At all Ages.		Under 5 Years.		Above 20 Years.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Towcester . .	2,321	2,390	7,134	6,189	475	573	1,558	1,294	426	602
New Forest . .	1,701	1,764	3,740	3,502	425	521	461	765	625	661
Glendale . .	1,555	1,466	3,499	3,173	215	218	259	166	306	299

Towcester.

The excess of the female pulmonary mortality in Towcester is occasioned by phthisis ; and the number of deaths recorded both from phthisis and from diseases of the respiratory organs in the several years of the period do not fluctuate more than might reasonably be expected. There is likewise a proportionate increase of deaths in both sexes in such years as, like 1853, were marked by an increase of pulmonary disease. In short, a critical examination of the data upon which the calculations are based does but tend to confirm the correctness of the general results.

In New Forest, already referred to at page 51, where the female pulmonary mortality is greatly in excess, the excess of the female over the male death-rate is very large in early life, and comparatively small in adult life. In Towcester the male is greater than the female pulmonary death-rate in early life; but the female greatly exceeds the male death-rate in adult life. Glendale, the district of model salubrity, has been placed in juxtaposition with Towcester and New Forest in the above table (page 56), to show how greatly the death-rates in the latter districts exceed what may almost be considered as the normal mortality that prevails in the former.

Districts of straw-plait manufacture.

The differences of the male and female death-rates are less remarkable in Hemel Hempstead, Leighton Buzzard, and Berkhampstead, where females are largely employed in the manufacture of straw-plait, an occupation in which also a small per-centage of the men are employed, than in the lace-making districts. Without any assignable cause, Hemel Hempstead is much healthier than either of the other districts. Berkhampstead, where the mortality is high, contains a considerable proportion of urban population, and both there and in Hemel Hempstead and Leighton Buzzard the people are closely aggregated on the surface of the earth. The amount of house accommodation, so far as this can be estimated by the average number of persons to a house, is equal in Bideford, Hemel Hempstead, Berkhampstead, Yeovil, and Luton. In each of these places there were on an average 5·1 persons to each house in 1851. Towcester has the smallest average, there being only 4·5 persons to each dwelling. In Newport Pagnell there are 4·7; in Bedford, 4·9; in Wycombe and Leighton Buzzard, 5; and in Holsworthy, 5·3 persons on the average to each house. No conclusion can be drawn from these facts, Luton, where the mortality is greatest, and Bideford, where it is least, being in this respect precisely in the same position. The district of Luton comprises the two towns, Luton and Dunstable, the chief centres of the straw-bonnet manufacture, and considerably more than half the inhabitants reside in the urban portion of the district. Perhaps this circumstance accounts for its comparatively high death-rate from pulmonary diseases, which are also, as in the majority of towns, more fatal to males than to females.

Proportion of inmates to each house in the places comprised in Table XXV.

Bideford and Holsworthy.

Although the influence of in-door density of population is by no means generally evident, the high death-rate from pulmonary affections of Holsworthy, as compared with the adjoining district of Bideford, may be partly explicable by the greater number of persons to a house in the former.

Table XXVII. *Male and female pulmonary death-rates, with the population-density, and the proportion of paupers, of men employed in agriculture, and of women in glove-making, in Bideford and Holsworthy.*

Male.		Name of District.	Female.		Urban Per-centage of Popula-tion.	Pro-portion of Paupers per 1,000 Persons.	Persons to a Square Mile.
Per-centage of Men engaged in Agri-culture.	Death-Rates from Pul-monary Affec-tions per 100,000.		Death-Rates from Pul-monary Affec-tions per 100,000.	Per-centage of Women engaged in Manu-facture.			
44·7	415	Bideford . . .	353	3·9	29	68	171
70·9	451	Holsworthy . .	426	3·7	0	69	84

Comments on Table XXVII.

Bideford and Holsworthy are adjoining districts in the north of Devonshire. The former contains a small town, and less than half the adult male inhabitants are employed in agriculture; its population is aggregated twice as closely upon the surface of the earth as the population of Holsworthy; the proportion of paupers in the population of Bideford very slightly exceeds the proportion in Holsworthy; and the number of females employed in the manufacture of gloves in Bideford, the sole female industrial employment of both districts, fractionally exceeds the number so employed in Holsworthy. Holsworthy is an entirely rural district, where more than two-thirds of the men are employed in the cultivation of the soil, and the only evident point in which it contrasts unfavourably with Bideford, is that the inhabitants are more closely distributed within the houses. The mean average death-rate of Holsworthy from pulmonary diseases exceeds the pulmonary death-rate of Bideford in the proportion of 56 per 100,000 persons. It is indeed true that this proportion is so small in such districts as to be caused by an excees of only seven or eight deaths per annum in Holsworthy over the number that takes place in the same number of the inhabitants of the more populous district of Bideford; but here again a critical examination of the numbers that died in each place, in each of the seven years, confirms the correctness of the data upon which the calculation is based, and seems to show that there is some persistent influence at work among the people of Holsworthy which causes them to perish in a larger proportion from pulmonary affections than those of Bideford. There are on an average 5·1 persons to each house in Bideford; the proportion in Holsworthy is 5·3. The difference in figures is not great, but it probably represents a considerable difference in reality, for the dwellings of all classes of the community are included in calculating the average. Before, however, the larger proportion of deaths from pulmonary affections in Holsworthy be referred to the greater overcrowding of houses there, one circumstance to which reference has already been made, must be taken into consideration. Bideford most likely contains a larger number of the middle classes of society, for the number of female domestic servants in proportion to its population is nearly three times as great in Bideford as in Holsworthy. If, therefore, the greater crowding of dwellings be one cause of the higher pulmonary mortality of Holsworthy, it is probably not the exclusive cause. Perhaps the lower pulmonary mortality of Bideford is due rather to an excess of persons of a superior station amongst its inhabitants, for the middle classes usually escape many causes of ill health to which persons of a lower grade are habitually exposed.

2. COMMERCE AND MARITIME PURSUITS.

2. COMMERCE AND MARITIME PURSUITS.—Under this head are comprised the most purely urban districts in the kingdom. Including London, the mortality of twelve such districts has been investigated. From 95 to 100 per cent. of the population of all these places reside in towns, the inhabitants of which are usually both closely aggregated on the surface of the soil, and

Peculiarities of commercial and sea-port towns.

also more closely crowded within their dwellings, than is the case in smaller towns and rural places. Such towns perhaps always, likewise contain a large quantity of what is termed tenemented property, that is, houses originally constructed for the occupation of single families, but which, from change of circumstances, having ceased to become desirable residences for their original occupants, are subdivided and let out to several families, often to as many families as there are separate rooms. It is scarcely necessary to say that a large proportion of such property is very ill adapted for the purpose to which it has been converted, and that some of the greatest evils of town life to the working classes arise from their being compelled to reside in such habitations. The proportion of men employed in the cultivation of the earth is exceedingly small in all the twelve places. Ipswich, where 8 per cent. and West Derby, where nearly 9 per cent. of the men, are engaged in agriculture, possess by far the largest proportion of agricultural labourers. These commercial and maritime towns, therefore, present city life in its intensest form; and it is chiefly on that account, and because they possess no very definite industrial character, that they have been selected for investigation. Three of the towns are at once commercial and maritime; namely, Gravesend, Liverpool, and Hull. London, Bristol, and Newcastle-on-Tyne are essentially commercial cities. Ipswich and West Derby are less densely peopled than the others, and are neither decidedly maritime nor exclusively commercial in character. Portsea, Plymouth, East Stonehouse, and Stoke Damerel, the two latter of which form the parliamentary Borough of Devonport, are naval and military stations.

TABLE XXVIII.

Male and female pulmonary death-rates, with the population-density, and the proportion of paupers and of seamen in the population of maritime towns.

Name of District.	Death-rates from Pulmonary Affections.		Percentage of Seamen in the Adult Male Population.	Urban Percentage of Population.	Persons to a Square Mile.	Persons to a House.	Proportion of Paupers per 1,000 Persons.
	Male per 100,000.	Female per 100,000.					
Hull	589	525	25·0 *a*	100	17,750	5·0	†
Plymouth	657	569	11·6	100	20,441	9·6	†
Portsea Island	678	558	6·1	100	5,914	5·6	71
Gravesend	684	516	23·2 *a*	100	6,908	6·0	38
Newcastle-on-Tyne	691	594	8·2	98	8,034	8·2	71‡
Ipswich	691	615	5·3	100	2,497	4·7	63
Stoke Damerel	704	525	8·4	100	10,266	9·8	†
West Derby	731	632	8·1	76	1,940	6·1	35
London	758	593	3·3	100	19,375	7·7	—
East Stonehouse	973	527	5·3	100	19,913	10·2	58
Bristol	979	742	6·5	100	22,858	7·1	†
Liverpool *	1,062	939	18·2	100	74,446	7·2	56§
ENGLAND AND WALES	569	535	—	50	307	5·5	—

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* The death-rates of Liverpool are for an average of only six years. A fraud in the returns from one of the sub-districts in 1848 rendered it undesirable to include that year in the calculation.

† No return.

‡ Average for six years.

§ Average for only two years.

a Including a considerable number of boatmen and bargemen engaged in inland navigation.

East Stonehouse.

In his 16th Annual Report (p. 146) the Registrar-General mentions that the proportion of deaths in East Stonehouse is raised from 26 to 29 in each 1,000 inhabitants when the deaths of persons in the Royal Naval Hospital are included in the calculation. They are included in the present calculation; and no doubt it is for this reason that the male death-rate from pulmonary affections in East Stonehouse is so immensely higher than that of females. The case is altogether exceptional, and, but that it illustrates the necessity for taking every possible cause of disturbance into account in such calculations as the present, might as well have been omitted from the investigation. Liverpool, Bristol, and London are the densest towns; they are also those in which the mortality is highest. But that the pulmonary mortality is not in exact accordance either with the superficial density of the population, the closeness of its distribution in houses, or the amount of pauperism, is clear from the circumstance that Plymouth, Hull, Newcastle-on-Tyne, and Portsea Island sustain a smaller proportionate pulmonary death-loss than Ipswich, which is smaller, less densely peopled, and has a smaller average number of persons to each house.

Comments on Table XXVIII.

Comparative pulmonary death-rates of the sexes.

The male exceeds the female death-loss in all these commercial and maritime towns; and this is not only true of the entire class of pulmonary diseases, but also of phthisis, which is naturally more frequent in females. The amount of difference in the death-rates of the sexes varies a good deal. Excluding East Stonehouse, on account of the peculiarity already mentioned, it is greatest in Stoke Damerel, Gravesend, and Bristol, in each of which, the male death-rate being assumed to be 100, the female death-rate is about 75. The male and female death-rates approximate nearest in Hull, Ipswich, and Liverpool, where, the male death-rate being assumed as 100, the female death-rate is about 89. The male and female pulmonary death-rates of West Derby, Plymouth, Newcastle, and Portsea Island have differences intermediate between these extremes. The male pulmonary death-rate of England and Wales and of London being each assumed tobe 100, the female death-rates are, England and Wales 94, London 78.

Proportion of general mortality produced by pulmonary affections.

The data have not been obtained from which to calculate the proportion of the general death-loss that is occasioned by pulmonary affections in each of the districts; but in Hull, where the pulmonary death-rate is lowest, 18 per cent. of all the deaths in each sex are produced by pulmonary affections. In Liverpool rather more than 27 per cent. of all the male deaths, and rather more than 26 per cent. of all the female deaths, arise from the same cause. In Bristol rather less than 30 per cent. of all the male, and rather more than 27 per cent. of all the female, deaths are produced by pulmonary affections.

The mortality occasioned by pulmonary disease in the three towns, Liverpool, Bristol, and Hull, does not, as in some places to which I shall presently advert, or as in the district of Towcester, already mentioned, occur chiefly at any particular period of life. The infantile mortality is high in each of the three towns both from all causes and from pulmonary affections; but the proportion between the deaths from all causes and those from pulmonary affections varies in each place. Whilst in Liverpool the pulmonary death-rate of adults is a little below the pulmonary death-rate for the whole of life, in Hull and Bristol the death-rate of adults exceeds the death-rate of the entire population, including persons of all ages. Supposing the death-rate for the whole of life, in a certain number of the living of each sex and in each place to be represented by 100, the mortality among the same number of boys below five years of age in Liverpool would be 291, of girls 251; in Bristol the boys' death-rate would be 248, the girls' death-rate 252; in Hull the boys would die at the rate of 211, the girls at the rate of 250. Adult men and women aged twenty years and upwards would, on the same supposition, die at the following rates:—Liverpool, men 98, women 80; Bristol, men 109, women 99; Hull, men 117, women 107. The low pulmonary mortality of Hull is remarkable; the inhabitants of Sculcoates, a district that surrounds Hull much as West Derby surrounds Liverpool, also sustain a proportionably low pulmonary death-loss. The males of Sculcoates annually die from pulmonary affections at the rate of 438 per 100,000 males of all ages; the females at the rate of 418 per 100,000 females of all ages. In other respects neither Hull nor Sculcoates are remarkable for salubrity.

TABLE XXIX. *Death-rates from all causes and from pulmonary affections at different ages in Liverpool, Bristol, and Hull.*

Name of District.	Death-Rates from all Causes.				Death-Rates from Pulmonary Affections.					
	All Ages.		Under 5 Years.		All Ages.		Under 5 Years.		Above 20 Years.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Liverpool	3,814	3,496	14,938	13,985	1,062	939	3,092	2,364	1,044	759
Bristol .	3,220	2,702	10,008	8,987	979	742	2,072	1,858	1,146	794
Hull .	3,161	2,865	10,203	9,261	589	525	1,465	1,323	643	523

Comments on Table XXIX.

3. MINING.

3. MINING.—There is no class of places in which the influence of occupation on health is more powerful or so evident as in some of the mining districts. Mining operations are frequently pursued in situations naturally salubrious, and generally more or less removed from great cities. In many cases the little centres of population that spring up in mining districts are exclusively inhabited by miners and their families, and the classes who minister to the wants of the mining population. Hence the influence of the prevailing occupation on the health of those engaged in it is proportionably evident. Females are rarely employed in mining; the total number so employed in the whole kingdom is most insignificant, and does not, for every form of mining, amount to eleven thousand. The influence of certain kinds of mining on the health of miners is therefore rendered additionally evident by the difference in the male and female death-rates of the same places, and the direct relation that exists between this difference and the proportion of men employed in

the mines. The health of the mining districts will be most conveniently considered under four heads; namely:—*a.* Lead mining; *b.* Tin and copper mining; *c.* Coal mining; and *d.* Mixed coal and iron mining.

(a) *Lead Mining.*

(a) *Lead Mining.*—This kind of mining appears to be very injurious to health. The differences of pulmonary death-rate in the sexes are well marked, and correspond pretty nearly to the proportion of men engaged in mining:

TABLE XXX. *Male and female pulmonary death-rates in mining districts, with the population-density, and the proportion of paupers and of men engaged in agriculture and* LEAD MINING.

Name of District.	Death-rates from Pulmonary Affections.		Per-centage of Adult Men engaged in		Urban Per-centage of Population.	Persons to a Square Mile.	Proportion of Paupers per 1,000 Persons.
	Male per 100,000.	Female per 100,000.	Agriculture.	Lead Mining.			
Aberystwith . .	491	429	33·0	17·8	22	115	44
Pateley Bridge *a* .	508	391	46·5	9·5	0	72	58
Weardale *b* . .	532	497	15·9	32·4	0	103	44
Holywell *c* . .	552	501	22·4	14·6	22	294	83
Reeth . .	724	528	19·0	49·6	0	62	54
Alston . . .	877	494	8·2	58·8	29	125	44
ENGLAND AND WALES	569	535	26·5	*d*	50	307	—

a Pateley Bridge. 15·5 per cent. of the adult men and 8·5 per cent. of the adult women are employed in the manufacture of flax.

b Weardale. 6·6 per cent. of the adult men are employed in coal mining, and 8·2 per cent. in iron mining and manufacture.

c Holywell. 11·3 per cent. of the adult men are employed in coal mining.

d England and Wales 4·4 per cent. of the adult men are employed in the several kinds of mining and quarrying.

Comments on Table XXX.

Comparison of death-rates in lead-mining and adjacent districts.

The male death-rate from pulmonary affections is considerably higher than the female in each of the six districts shown in the table, and the excess is greatest in the purely lead-mining districts of Reeth and Alston, where the majority of the men are lead-miners. The female mortality is also higher in the districts of Aberystwith, Weardale, Holywell, Reeth, and Alston, than in several other districts equally rural, and where, as in these lead-mining districts, the females follow no special occupation. For example, the female death-loss from pulmonary diseases in the registration district of Richmond in Yorkshire, which includes the town of the same name, and is contiguous with the rural and lead mining district of Reeth, is at the rate of 451 per 100,000 females of all ages; that of Reeth is 528. Alston and Weardale are adjoining districts. On the northern border of Alston lies the district of Haltwhistle, which is conterminous with the wide tract of country comprised in the registration districts of Bellingham, Rothbury, and Glendale, to which I have already had occasion more than once to refer as one of the healthiest portions of England. The female pulmonary death-rates of Alston and Weardale per 100,000 females of all ages are 494 in the former and 497 in the latter district. The female pulmonary death-rate of Haltwhistle is only 399 per 100,000. The male pulmonary death-rate in each of these places being considered as 100, the female pulmonary death-rates would be 56·3 in Alston, and 72·5 in Reeth; those of Richmond and Haltwhistle, where, as in most healthy places, the pulmonary death-rates of females are higher than those of males, would be 113 in the former, and 121·6 in the latter.

Pulmonary death-rates at different ages in lead-mining districts.

If any doubt of the pernicious influence of lead mining upon health should remain, the comparison of the pulmonary death-rates of children under five years and of adults over twenty years of age with the pulmonary death-rates of each sex for the whole of life would entirely remove it. These facts are here placed in juxtaposition with similar facts for Haltwhistle and Liverpool; the former district being selected on account of its contiguity to Alston; the latter because, of the hundred and five districts, it is that in which the pulmonary mortality is highest. The mortality of children during the first five years of life from all causes in Alston and Reeth is rather, but not a great deal, higher than prevails in Haltwhistle, but the mortality from pulmonary diseases is much higher. When, however, the mortality of children in the city of Liverpool is contrasted with the mortality of children in Alston and Reeth, it is found that, although the pulmonary death-loss in the two lead-mining districts is considerably higher than that which is sustained by the healthy agricultural district, it is immensely below that which is sustained by the infantile population of the great unhealthy city. This advantage enjoyed by the younger inhabitants of the lead-mining districts over those of Liverpool is altogether lost in more advanced life. The women of Liverpool perish from chest affections in a rather larger proportion than those of Reeth; in a slightly lower proportion than the women of Alston; but the men of Alston and Reeth die in a much larger proportion than the men of Liverpool. Thus a district remote from city influences, situated in the midst of a most salubrious district, and containing scarcely an appreciable urban character, (since although 29 per cent. of the inhabitants of Alston reside in the town that gives name to the district, the town only contained 2,005 inhabitants in 1851,) loses a larger annual proportion of its adult male inhabitants from diseases of the chest than the unhealthiest city in the kingdom. That this is due to the nature of the prevalent employment no doubt can now be entertained. It is the injurious character of the male occupation which causes Alston, the most exclusively lead-mining district in England, to be the place in which there is a larger proportion of widows than in any other place in the kingdom.* Alston has been a lead-

TABLE XXXI. *Death-rates from all causes, and from pulmonary affections at different ages in Haltwhistle, Alston, Reeth, and Liverpool.*

Name of District.	Death-Rates from all Causes.				Death-Rates from Pulmonary Affections.					
	All Ages.		Under 5 Years.		All Ages.		Under 5 Years.		Above 20 Years.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Haltwhistle	1,628	1,727	3,704	3,385	328	399	448	207	374	583
Alston .	2,037	1,711	4,288	3,453	877	494	561	324	1,440	779
Reeth .	2,051	1,852	4,321	3,376	724	528	633	558	1,298	717
Liverpool .	3,814	3,496	14,938	13,985	1,062	939	3,092	2,364	1,044	759

Comments on Table XXXI.

Alston.

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* According to the Census Report for 1851 (Part II. Vol. 1. p. xli.), 21·4 per cent. of the women of Alston are widows.

mining district for many centuries, and the inhabitants have propably acquired some of those peculiarities of physical character to which the term race may properly be applied. Amongst these peculiarities, a tendency to pulmonary diseases must probably be included, and hence the greater proportionate mortality of women and children from such diseases in Alston than in places which approximate to it in character in all respects save the occupation of their inhabitants. Certain it is, that lead miners and coal miners are in the north of England readily distinguishable by their aspect, both from each other and from the rest of the world, by persons conversant with their appearance. It is not unimportant to observe that the majority of the men of Alston who die of pulmonary diseases are returned as having died of asthma.*

(b) *Tin and copper mining.*

(b.) *Tin and copper mining.*—Tin and copper are, next to lead mining, the most pernicious forms of mining. Of the three districts that have been selected, Penzance is almost exclusively a tin-mining district, Redruth is chiefly a copper-mining district, and Liskeard a mixed district in which tin, copper, and lead are all worked. About one-third of the miners of Liskeard are lead miners.

TABLE XXXII. *Male and female pulmonary death-rates in mining districts, with the population-density, the proportion of paupers and of men engaged in agriculture and in* TIN AND COPPER MINING.

Name of District.	Death-Rates from Pulmonary Affections.		Per-centage of adult Men engaged in		Urban Per-centage of Population.	Persons to a Square Mile.	Proportion of Paupers per 1,000 Persons.
	Male per 100,000.	Female per 100,000.	Agriculture.	In Tin or Copper Mining.			
Liskeard *a*	491	432	37·4	26·4	13	191	49
Penzance	560	436	20·8	29·3	29	526	21
Redruth *b*	670	450	11 0	53·8	25	852	40
ENGLAND AND WALES	569	535	26·5	*c*	50	307	—

a Liskeard. 17·8 per cent. of the men are tin and copper miners; 8·6 per cent. are lead miners.
b Redruth. 6·5 per cent. of the adult women are engaged in mining.
c England and Wales. 4·4 per cent. of the adult men are employed in the several kinds of mining and quarrying.

Comments on Table XXXII.

Here also the male exceed the female death-rates from pulmonary affections, and very nearly in accordance with the proportion of men employed in mining. The female death-rate of Redruth is slightly higher than that of Liskeard, and scarcely differs from that of Penzance, notwithstanding that a small number of the women of Redruth are employed in the mines. Probably the female miners are less exposed to inhale gritty dust than the men. Redruth has a slightly smaller proportion of its men employed in mining than Alston, and a rather larger proportion than Reeth; its inhabitants are much more densely aggregated on the surface of the soil than those either of Alston or Reeth; a larger proportion of its men are engaged in agriculture than of the men of Alston, a smaller proportion than those of Reeth; but its male pulmonary death-rate, both for the whole of life and likewise for adult life, is less than either that of Reeth or Alston. The pulmonary mortality of adult women in Redruth is below the pulmonary mortality of the women of Alston and Reeth. The general state of the public health of Redruth is inferior to that of Alston. The mortality in early life especially, both from all causes and from pulmonary affections in the former, is much higher than the mortality sustained by the young population of the latter. Notwithstanding this, the influence of occupation seems well marked, for the death-rate of adult men is very nearly twice as high as the death-rate of women. Whilst the adult pulmonary death-rate of Liverpool is less than the pulmonary death-rate for the whole period of life, the adults of both sexes in Redruth, but particularly the males, perish in larger proportion than persons of all ages.

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* Mr. Thackrah says, "lead miners are injured by working ore in sandstone, but "are sensible of no inconvenience when the ore is in limestone. The reason assigned "for this difference is, that the latter is full of vertical and other fissures, which allow "the superincumbent beds of water to percolate through the roof of the mine, whilst "the sandstone strata, which are impervious to water, preserve the mine quite dry; "consequently, the minute particles of rock formed by blasting or the pickaxe are "kept in a dry state within the sandstone mine, forming, as it were, an atmosphere of "dust, which the miner is constantly inhaling."—"The effects of Arts, Trades, and "Professions as affecting Health and Longevity," by C. Turner Thackrah, Esq., 2d edition. London. 1832. pp. 89. 90.

Comments on Table XXXIII.

TABLE XXXIII.

Death-rates from all causes and from pulmonary affections at different ages in Alston, Redruth, and Liverpool.

Name of District.	Death-rates from all Causes.				Death-rates from Pulmonary Affections.					
	All Ages.		Under 5 Years.		All Ages.		Under 5 Years.		Above 20 Years.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Alston .	2,037	1,711	4,288	3,453	877	494	561	324	1,440	779
Redruth .	2,256	1,947	6,950	6,376	670	450	1,231	1,062	942	479
Liverpool .	3,814	3,496	14,938	13,985	1,062	939	3,092	2,364	1,044	759

(c) *Coal mining.*

(c) *Coal mining.*—Whilst lead and copper and tin mining are certainly dangerous to health, coal mining appears to be at least not unhealthy. A proportion scarcely exceeding 4 per cent. of the men of Glendale are coal miners; and, exclusive of nearly 3 per cent. of quarrymen, upwards of 12 per cent. of the adult men of Haltwhistle are colliers; yet Glendale and Haltwhistle are singularly healthy districts. The only purely coal mining districts included in the inquiry are Easington and Houghton-le-Spring. There are others, like Tynemouth and Gateshead, in which coal mining forms a considerable source of industry, but in

TABLE XXXIV.

Male and female pulmonary death-rates in colliery districts, with the population-density, and the proportion of paupers and of men engaged in agriculture and COAL MINING.

Name of District.	Death-rates from Pulmonary Affections.		Per-centage of adult Men engaged in		Urban Per-centage of Population.	Persons to a Square Mile.	Proportion of Paupers per 1,000 Persons.
	Male per 100,000.	Female per 100,000.	Agriculture.	Coal Mining.			
Glendale . . .	215	218	57·1	4·2	0	65	53
Easington *a* . .	222	264	12·0	49·9	0	362	27
Haltwhistle *b* . .	328	399	37·9	12·4	0	56	26
Houghton-le-Spring	364	394	10·2	47·3	16	773	38
Tynemouth *c* . .	507	506	6·5	27.5	45	1,035	49
Gateshead *d* . .	562	516	6·9	13·9	53	1,186	47
ENGLAND AND WALES	569	535	26·5	*e*	50	307	—

a Easington. 8·4 per cent. of the men are seamen and pilots.

b Haltwhistle. 2·6 per cent. of the men are stone-quarriers.

c Tynemouth. 3·4 per cent. of the men are shipwrights; 16·3 per cent. are seamen and pilots; and 6·9 per cent. are employed in iron manufactures.

d Gateshead. 1·9 per cent. of the men are stone-quarriers; 12·9 per cent. are employed in iron manufactures; and 2·4 per cent. in the manufacture of glass.

e England and Wales. 4·4 per cent. of the adult men are employed in the several kinds of mining and quarrying.

which the urban element preponderates, or in which other pursuits likewise enter largely into the occupations of the people.

Comments on Table XXXIV.

The male pulmonary death-rate exceeds the female in the lead, tin, and copper mining districts. The female pulmonary mortality resumes its normal position in the coal mining districts of Easington and Houghton-le-Spring. These are essentially coal mining districts. In each of them nearly half the adult male inhabitants are colliers, and only a very small proportion are agricultural labourers. Houghton-le-Spring contains a small town. Easington borders upon the sea, and comprises the rising little port of Seaham Harbour, the property of the Marchioness of Londonderry, constructed for the shipment of coals. This accounts for the existence of as many as 8·4 per cent. of pilots and seamen amongst the adult men of the latter district. The population of Easington increased very largely during the decennium between the census of 1841 and that of 1851, partly in consequence of the works at Seaham Harbour, partly on account of the increase of collieries and railroads. It is probable that the immigrants have chiefly been of adult age, and therefore of the healthiest portion of life; hence perhaps the mortality contrasts somewhat too favourably with that of the adjoining district of Houghton-le-Spring. Even if this be admitted, and if the mortality of Easington, when corrected for this circumstance, be a little raised above its present rate, the two districts must still be considered as singularly healthy. It is not unimportant to observe that, although the pulmonary death-rate of Houghton-le-Spring is higher than the pulmonary death-rate of Easington for the whole of life, the deaths of children below five years of age from all causes do not differ greatly in proportion in the two districts, and are in both considerably higher than in Haltwhistle.

Easington and Houghton-le-Spring.

TABLE XXXV.

Death-rates from all causes and from pulmonary affections at different ages in Glendale, Haltwhistle, Easington, and Houghton-le-Spring.

Name of District.	Death-rates from all Causes.				Death-rates from Pulmonary Affections.					
	All Ages.		Under 5 Years.		All Ages.		Under 5 Years.		Above 20 Years.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000
Glendale.	1,555	1,466	3,499	3,173	215	218	259	166	306	299
Haltwhistle .	1,628	1,727	3,704	3,385	328	399	448	207	374	583
Easington	1,804	1,756	6,150	5,513	222	264	496	371	221	357
Houghton-le-Spring	2,057	2,025	6,581	5,561	364	394	832	665	368	474

Comments on Table XXXV.

Independently of the circumstance that there are no violent fluctuations in the number of deaths from year to year, in the four districts given in the above table, the death-rates themselves, when compared with each other, affords strong evidence in support of their correctness. Glendale and Haltwhistle are neighbouring distrtcts, in many respects analogous to each other, and the proportion of deaths in young children from all causes does not greatly vary; the excess in Haltwhistle not being more than in proportion to the small excess in the general death-rate of Haltwhistle over the general death-rate of Glendale. The comparatively large pulmonary death-rate in the adult female population of Haltwhistle is remarkable. It is produced chiefly by the greater number of women than of men that have died from phthisis, and appears to be tolerably reliable, for although the number of deaths annually recorded in the death-register is small in both sexes, there is a regular and uniform relation in the number of male and female deaths. So likewise the infantile mortality from all causes does not differ materially in the contiguous districts of Houghton-le-Spring and Easington, although in both it is considerably higher than in the other districts that are contrasted with them in the table.

Tynemouth and Gateshead.

Tynemouth and Gateshead are partly rural and partly urban districts, in which a very small proportion of the inhabitants are engaged in agricultural occupations. Rather more than half the inhabitants of Gateshead are resident in the town; somewhat less than half the people of Tynemouth reside in the urban portions of the district.* Tynemouth has a larger proportion of colliers amongst its population than Gateshead; Gateshead has a larger number of men engaged in manufacturing occupations than Tynemouth. The pulmonary death-rate of Gateshead is higher than that of Tynemouth; and whilst in the latter the male and female death-rates are equal, the male exceeds the female death-rate in the former. Considering the size of the towns contained in both districts, the very small proportion of agricultural labourers, and the amount of manufacturing industry in each, they must be considered comparatively healthy as regards the amount of pulmonary disease. The pulmonary death-rates of Gateshead are lower than the average pulmonary death-rates of the whole kingdom. Among the chief seaports, Tynemouth presents the lowest pulmonary mortality, and is in this respect superior even to such places as Bromsgrove, Alcester, Stafford, Northampton, Yeovil, and Luton, which contain a much larger number of agricultural labourers in proportion to their size.

Comparison of the death-rates in several kinds of mining districts.

The mortality of the several kinds of mining districts having been worked out minutely, before passing from this branch of my subject it may be well to contrast the several death-rates from pulmonary diseases in some of the lead, copper, and coal mining places that have been discussed. For this purpose I have selected Alston, Redruth, and Houghton-le-Spring as being each a fair representative of its class; Houghton-le-Spring is preferred to Easington on account of the much smaller change the composition of its population underwent during the decennium between the census of 1841 and that of 1851.

TABLE XXXVI.
Death-rates from all causes and from pulmonary affections at different ages in Houghton-le-Spring, Redruth, and Alston.

Name of District.	Death-rates from all Causes.				Death-rates from Pulmonary Diseases.					
	All Ages.		Under 5 Years.		All Ages.		Under 5 Years.		Above 20 Years.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Houghton-le-Spring	2,057	2,025	6,581	5,561	364	394	832	665	368	474
Redruth .	2,256	1,947	6,950	6,376	670	450	1,231	1,062	942	479
Alston .	2,037	1,711	4,288	3,453	877	494	561	324	1,440	779

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* The small town of Blyth as well as the borough of Tynemouth is included in the Tynemouth registration district.

Comments on Table XXXVI.

The principal facts shown by the table have already been the subject of comment. The condition of the public health in Redruth is inferior to that of either Houghton-le-Spring or Alston, and the death-rates of children both from all causes and from pulmonary affections are proportionably high. The differences in the death-rates of the adult men are much larger than the differences in the proportions of men employed in mining. The adult male pulmonary death-rate of Alston is 1,440 per 100,000; that of Redruth is 942; of Houghton-le-Spring 368. In Alston 58·8 per cent. of the men are lead-miners; in Redruth 53·8 per cent. of the men are copper-miners; in Houghton-le-Spring 47·3 per cent. of the men are colliers. The high pulmonary mortality sustained by the women of Alston, as compared with the death-rates of the women of Redruth and Houghton-le-Spring, is favourable to the supposition already suggested that it is at least partially caused by acquired peculiarity of race.

(d) *Mixed Coal and iron mining.*

(d) *Mixed coal and iron mining.* There are several districts in which the population are engaged both in coal and iron mining. There are others in which coal mining is combined with iron or other manufactures. To districts in which coal and iron mining or iron manufactures are combined, I now propose to direct our attention. The pulmonary mortality of these places is higher than prevails in the purely coal-mining districts; lower than the mortality in the lead and copper and tin mining districts.

TABLE XXXVII. *Male and female pulmonary mortality in mining districts, with the population-density, and the proportion of paupers and of men employed in agriculture,* COAL AND IRON MINING *and* IRON MANUFACTURE.

Name of District.	Death-rates from Pulmonary Affections.		Per-centage of Adult Males engaged in				Urban Per-centage of Population.	Persons to a Square Mile.	Proportion of Paupers per 1,000 Persons.
	Male per 100,000.	Female per 100,000.	Agriculture.	Coal Mining.	Iron Mining.	Iron Manufacture.			
Ulverstone *a*	451	430	37·4	1·2	5·5	0·	21	145	38
Chesterfield	456	502	27·1	16·5	5·0	6·9	16	309	28
Madeley *b* .	523	500	12·6	14·6	8·7	14·0	81	633	43
Gateshead .	562	516	6·9	13·9	0·	12·9	53	1,186	47
Wrexham .	566	542	28·6	19·4	0·	3·0	16	312	49
Merthyr Tydfil .	661	654	5·2	24·1	13·4	15·8	80	435	45
Abergavenny	662	601	12·0	25·6	11·1	18·9	22	430	18
ENGLAND AND WALES	569	535	26·5	*c*	*c*	*c*	50	307	—

a Ulverstone. 3·6 per cent. of the adult men are slate and stone quarrymen; 2·6 per cent. are copper miners.

b Madeley. 2 per cent. of the adult females are employed in the manufacture of metals.

c England and Wales. 4·4 per cent. of the adult men are employed in the several kinds of mining and quarrying; and 4·4 per cent. in metallic manufactures.

Comments on Table XXXVII.

High pulmonary death-rates of Welsh districts.

Ulverstone is placed here because amongst the selected districts it is the only one in which next to agriculture iron mining is the chief occupation of the inhabitants. Chesterfield, the next place on the list, also contains in its population a large proportion of persons engaged in agricultural pursuits, and is almost a rural district. It is the only place of the eight in the table in which the female exceeds the male death-rate. The Welsh districts, Wrexham, Merthyr Tydfil, and Abergavenny, sustain a high pulmonary mortality. In Merthyr and Abergavenny this is probably due, at least in part, to the large number of adult men employed in iron mining and iron manufactures. Although the pulmonary death-rate of Wrexham is considerably less than that of either Merthyr or Abergavenny, it is very high, considering the small urban element, the moderate density of the population, the moderate amount of pauperism, and the very small proportion of the men that are engaged in iron manufactures. Gateshead, and still more Tynemouth, contrast favourably with Wrexham, although they are both more densely peopled, have a much smaller rural and agricultural element among their inhabitants, and have a larger proportion of their adult male population engaged in the manufacture both of iron and of other articles, as glass, &c. Carnarvon, another Welsh district, in which the prevalent occupation is slate quarrying, also possesses a high pulmonary death-rate.

Carnarvon.

No sufficient data are before me to justify any opinion as to the cause of the high pulmonary mortality of these Welsh districts; but the question of race very naturally occurs to the mind, and the present fact, taken in conjunction with the circumstance to be hereafter considered, that the nervous diseases of early life are also peculiarly fatal in the same districts, seems to indicate some peculiarity, either of diet, habit, or race, as affording the most probable explanation of the circumstance. The houses, if we may judge by the average number of their inhabitants, are not seriously overcrowded. In Carnarvon there are 4·8 persons to a house; in Holywell 4·8; in Wrexham 4·9; in Aberystwith 5·2; in Merthyr Tydfil 5·4; and in Abergavenny 5·5 persons to each house. On the other hand, it must not be forgotten that Builth, also a Welsh, but likewise a purely agricultural district, sustains a low mortality, both from all causes, from pulmonary diseases, and from the nervous diseases of children. The inhabitants of Builth are distributed at the rate of 5·4 persons to a house, and are, therefore, as regards the overcrowding of their dwellings, exactly on a par with the inhabitants of Merthyr Tydfil, and more crowded than those of Carnarvon, Holywell, or Wrexham.

Proportion of inmates to each house in Welsh districts.

Builth.

TABLE XXXVIII.
Death-rates from all causes and from pulmonary affections at different ages in Carnarvon.

Name of District.	Death-rates from all Causes.				Death-rates from Pulmonary Affections.					
	All Ages.		Under 5 Years.		All Ages.		Under 5 Years.		Above 20 Years.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Carnarvon	2,216	2,210	6,100	6,171	514	547	390	312	759	768

Comments on Table XXXVIII.

The adult pulmonary mortality is exceedingly high in both sexes in Carnarvon, considering that there is no evident occupational cause. The females of Carnarvon sustain a higher pulmonary mortality than the males, excepting below the age of five years, when pulmonary affections are more fatal to boys than to girls. As the females of Carnarvon follow no special form of industrial employment, it is scarcely necessary to say that the greater mortality of women is opposed to the supposition that the high pulmonary mortality is to be ascribed to the industrial occupation of the inhabitants.

As shown in the annexed table, agriculture forms a considerable branch of industry in the district of Carnarvon, and the people are only thinly distributed on the surface of the earth;

but the proportion of the pauper population is rather high. Thus far, however, we have not found any very decided relation between the amount of pauperism and the amount of disease, probably, as stated at the commencement of this paper, because the number of recipients of parochial relief affords only an imperfect mode of estimating the amount of poverty.

TABLE XXXIX.
Male and female pulmonary death-rates, with the population-density, and the proportion of paupers and of men employed in agriculture and in slate quarrying in Carnarvon.

Name of District.	Death-rates from Pulmonary Affections.		Per-centage of Adult Men engaged in		Urban Per-centage of Population.	Persons to a Square Mile.	Proportion of Paupers per 1,000 Persons.
	Male per 100,000.	Female per 100,000.	Agriculture.	Slate Quarrying.			
Carnarvon *a* . .	514	547	30·0	23·9	28	200	83

a A very small number, scarcely exceeding 1 per cent., of the men are employed in copper mining.

4. METAL MANUFACTURES.

4. METAL MANUFACTURES.—Several of the districts referred to in the last division are referable also to this head, since the manufacture of iron, as well as coal and iron mining, enters into the industrial occupations of the inhabitants. It is unnecessary to refer to them again; but Madeley and Gateshead are introduced again here for the sake of comparison. Including these two districts, eleven places in which metallic manufactures occupy the chief or at least an important position in the occupations of the people have been comprised in the investigation.

TABLE XL.
Male and female pulmonary death-rates in districts of METALLIC MANUFACTURE, *with the population-density, and the proportion of paupers and of men and women engaged in metal manufactures.*

Per-centage of adult Men engaged in		Death-rate from Pulmonary Affections per 100,000 Males.	Name of District.	Death-rate from Pulmonary Affections per 100,000 Females.	Per-centage of adult Women engaged in Metal Manufactures.	Urban Per-centage of Population.	Persons to a Square Mile.	Proportion of Paupers per 1,000 Persons.
Agriculture.	*Metal Manufactures.							
17·1	14·8	516	King's Norton *a* .	465	2·2	30	696	24
12·6	14·0	523	Madeley *b* . .	500	·0	81	633	43
40·8	16·0	559	Alcester *c* . .	577	13·0	11	213	58
6·9	12·0	562	Gateshead *d* .	516	·0	53	1,186	47
2·4	21·8	571	Dudley *e* . .	511	11·0	63	3,791	35
27·5	30·0	583	Bromsgrove *f* .	559	21·4	17	335	55
9·8	18·6	633	Aston *g* . .	539	4·1	74	1,368	10
9·4	25·6	731	Wolverhampton *h*	692	·0	86	1,237	24
9·1	43·6	736	Ecclesall Bierlow *i*	571	·0	92	1,163	28
1·6	24·4	838	Birmingham *k* .	699	7·1	100	41,853	35
3·2	40·9	839	Sheffield *l* . .	670	2·0	97	6,263	39
26·5	4·4	569	ENGLAND AND WALES . .	535	0·4	50	307	—

a King's Norton. The manufactures are brass founding, iron manufacture, anchor making, nail making, and such like. 3·5 per cent. of the men are employed in the manufacture of glass. 2·2 per cent. of the women are nail makers.

b Madeley. Iron manufacture. 23·3 per cent. of the men are miners; 2·3 per cent. of the men and 2·1 per cent. of the women are employed in the manufacture of earthenware.

c Alcester. Both men and women are employed in the manufacture of needles.

d Gateshead. Iron manufacture, anchor and boiler making, brass founding. 13·9 per cent. of the men are miners, 1·9 per cent. are stone quarrymen, 2·4 per cent. are glass makers.

e Dudley. Nail making and iron manufacture. 19·9 per cent. of the men are miners. The 11 per cent. of women are exclusively nail makers.

f Bromsgrove. 22·6 per cent. of the men and 14·2 per cent. of the women are nail makers; 7·4 per cent. of the men and 7·2 per cent. of the women are employed in the manufacture of needles.

g Aston. Brass founding, iron manufacture, button manufacture, gun and tool making. 1·2 per cent. of the men are glass makers. The women are employed in button making, &c.

h Wolverhampton. 10·8 per cent. locksmiths, 9·1 per cent. iron manufacture, the rest brass-founders, nail-makers, &c. 15·8 per cent. of the men are miners and quarrymen.

i Ecclesall Bierlow. Chiefly cutlers, file-makers, grinders, and other workers in steel.

k Birmingham. Brass-founders, button-makers, goldsmiths, gun-smiths, iron-manufacture, tool-makers, nail-makers, &c. 1·3 per cent. of the men are glass-makers.

l Sheffield. Cutlers, file-makers, grinders, and other workers in steel, and goldsmiths.

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* Only the more prominent manufactures in each place are employed in calculating the proportions.

Comments on Table XL.

In some of these places the prevalent manufacture is of a coarse description, as iron-founding, and anchor, boiler, and nail-making; in other places there is a mixture of manufactures, some of which are coarse, others of a finer description; there is also a third class of districts in which the work is chiefly of a fine kind, as cutlery and needle making. The male exceeds the female death-rate in all the districts, excepting Alcester, where a large proportion of the men are employed in agriculture, and nearly as many women as men are engaged in needle-making, which is the special manufacture of the place. The pulmonary death-rate is higher in Alcester than in any of the other districts equally rural, and where so large a proportion of the men are engaged in agricultural pursuits. The distribution of the inhabitants on the surface of the soil is by no means dense, and the proportion of paupers in the population is moderate, yet the pulmonary death-rates of Alcester contrast unfavourably both with many agricultural districts, and also with several more decidedly urban places,. as Bedford, Wellingborough, Knaresborough, Lewes, Chesterfield, and Tynemouth. Needle-making would appear to exercise an injurious effect upon health from the much higher pulmonary death-rate of the female population of Alcester than of Gateshead, Dudley, Bromsgrove, Aston, and Ecclesall Bierlow, each of which has a more decidedly urban character and a greater density of population. The greatest excess of male death-rate is in Birmingham, Eccleshall Bierlow, and Sheffield, where, especially in the two last, the finer kinds of metallic manufactures are made.

Alcester.

Influence of needle-making on health.

Influence of the manufacture of cutlery on health.

The pernicious influence on health of certain operations connected with the manufacture of cutlery has long been recognized, and it is here rendered evident by the high pulmonary death-loss among the males of Ecclesall Bierlow and Sheffield. Among the places comprised in this inquiry, Liverpool, Leeds, Manchester, Nottingham, and Bristol, approach nearest to Sheffield, Ecclesall Bierlow, and Birmingham, in the amount of mortality sustained by their inhabitants from pulmonary affections. Bristol is an exceptional district, remarkable for the wide diversity in the pulmonary death-rates of the sexes. Excluding Bristol, and assuming the male pulmonary death-rate in each of these towns to be 100, the female death-rates would be, Manchester 90·1; Liverpool 88·4; Leeds, 87·8; Nottingham 86·4. In Birmingham, the male death-rate being considered as 100, the female death-rate is 83·4; in Sheffield it is 79·8; in Ecclesall Bierlow it is even lower, being only 77·5. Exclusive of the metal mining districts, and of Bristol and Devonport, Sheffield and Ecclesall Bierlow present the greatest divergence of the male and female death-rates in this direction; but there are several places, as Newport Pagnell and Bedford, in which the female exceeds the male pulmonary death-rate by a little more than it falls short of the male death-rate in Ecclesall Bierlow and Sheffield. It will be observed that the difference in the male and female pulmonary death-rates is rather less in Sheffield than in Ecclesall Bierlow. A very small pro-

Comparison of male and female pulmonary death-rates.

portion of the females are employed in the manufactures of Sheffield. A somewhat larger number are employed in Birmingham, where the male death-rate being 100, the female would be 83·4.

Influence of coarse metallic manufactures on health.

The coarser kinds of metal manufacture, as iron-founding, nail-making, &c., seem to be much less injurious to health than the manufacture of cutlery. The difference in the death-rates of the sexes is less, even where, as in Gateshead and Madeley, women are not employed in the manufacture. It is therefore doubtful how far the death-rates are aggravated by this particular kind of industry in such places. Probably the workmen are comparatively much less exposed to inhale an atmosphere charged with fine mechanical particles in the coarser than in the finer kinds of metallic manufactures. It is well ascertained that the great mortality amongst cutlers and grinders arises from the irritation caused by the mechanical particles produced during the process of manufacture, and received into the lungs with the air in respiration.

5. *MANUFACTURE OF EARTHENWARE.*

5. Manufacture of Earthenware.—The mortality has been investigated for Stoke-upon-Trent and Wolstanton, the two chief seats of the earthenware manufacture in this country. The pulmonary mortality is high in both places, but it is not in exact accordance with the proportion of the adult inhabitants engaged in the prevalent manufacture in each place; for whilst the death-rate of males is about equal in the two districts, and the death-rates of the two sexes are equal in Wolstanton, the female is a good deal less than the male pulmonary death-rate in Stoke-upon-Trent, and of course equally below the female death-rate in Wolstanton. Stoke-upon-Trent, in which the lower death-rate of females occurs, is by far the most densely peopled, contains the largest proportion of urban inhabitants, and has the largest percentage both of men and women engaged in the earthenware manufacture. The comparison of these districts, therefore, is at variance with the opinion that preventable disease and excessive death-rates are in exact proportion to the density of a population. It is also not irrelevant to the present question to observe, that

Table XLI. *Male and female pulmonary death-rates in* Pottery Districts, *with the population-density, and the proportion of paupers and of men and women engaged in the manufacture of earthenware.*

Per-centage of adult Men employed in		Death-Rate from Pulmonary Affections per 100,000 Males.	Name of District.	Death-Rate from Pulmonary Affections per 100,000 Females.	Per-centage of adult Women engaged in Manufacture of Earthenware.	Urban Per-centage of Population.	Persons to a Square Mile.	Proportion of Paupers per 1,000 Persons.
Agriculture.	Manufacture of Earthenware.							
6·2	36·6	721	*Stoke-upon-Trent *a*	665	19·3	95	3,535	25
5·9	30·4	726	Wolstanton *b* .	727	13·9	68	1,961	35

* The borough of Stoke-upon-Trent comprises a considerable part of Wolstanton. 82 per cent. of the inhabitants of the two registration districts, Stoke-upon-Trent and Wolstanton, reside within the borough.

a Stoke-upon-Trent. 10·9 per cent. of the men are colliers.

b Wolstanton. 16·4 per cent. of the men are colliers, 3·5 per cent. are iron miners, and 3·4 per cent. are iron manufacturers.

Comments on Table XLI.

both the contagious diseases and the nervous diseases of children are fatal to a rather larger number of persons in proportion to the population in Stoke-upon-Trent; whilst diseases of the alvine flux class are more fatal in Wolstanton; and typhus is about equally fatal in both places.

Table XLII. *Death-rates from several causes at Stoke-upon-Trent, Wolstanton, and the West Midland Division.*

Death-rates from the under-mentioned Causes in Wolstanton and Stoke-upon-Trent, and in the West Midland Registration Division.

Male per 100,060.				Name of District.	Female per 100,000.			
Nervous Diseases of Children.*	Contagious Diseases.†	Alvine Flux.‡	Pulmonary Affections.		Pulmonary Affections.	Alvine Flux.*	Contagious Diseases.†	Nervous Diseases of Children.‡
374	327	152	721	Stoke-upon-Trent . .	665	150	330	283
341	212	192	726	Wolstanton . . .	727	185	231	275
192	203	165	586	West Midland Division . . .	547	150	201	148

* Hydrocephalus, convulsions, and teething.
† Small pox, measles, scarlatina, and hooping cough.
‡ Diarrhœa, cholera, and dysentery.

It is well known that some of the operations in the manufacture of earthenware are dangerous to health; and it is believed that their influence on health varies much with the greater or less pains bestowed upon the mode of manufacture; there may also be different degrees of danger in the manufacture of different kinds or qualities of earthenware. These questions could only be satisfactorily solved by a careful investigation of the subject in the pottery district.

Probable causes of ill-health in pottery districts apart from the particular industrial occupation.

There are, however, unhealthy unfluences at work in the pottery dsitrict quite irrespectively of the particular industrial occupation. Wolstanton, where the smallest proportion of the adult population is employed in the potteries, is likewise that in which the pulmonary mortality is highest. It is true, indeed, that the excess of the pulmonary death-rate of Wolstanton over the death-rate of the neighbouring district of Stoke-upon-Trent, is only obvious in the female sex:—for in dealing with proportions so large as the death-rate to 100,000 persons we must ignore altogether the insignificant difference that exists in the male death-rates;—but it is remarkable, not only because it occurs where the proportion of females employed in the special occupation of the district is smallest, but also where the urban element, whether measured by the density with which the inhabitants are aggregated together on the surface of the earth, or collected into towns, is least. And furthermore, the mortality is not only high, as in some of the places which have already been considered, at the period of life when the influence of occupation is greatest, but is also proportionally high in early life, showing that whatever be its nature the cause of the high pulmonary death-rate is in operation among children below five years of age.

TABLE XLIII. *Death-rates from all causes and from pulmonary affections at different ages in Wolstanton, compared with several other places.*

Death-rates, Male per 100,000.					Name of District.	Death-rates, Female per 100,000.				
Pulmonary Affections.			All Causes.			All Causes.		Pulmonary Affections.		
Above Twenty Years.	Under Five Years.	All Ages.	Under Five Years.	All Ages.		All Ages.	Under Five Years.	All Ages.	Under Five Years.	Above Twenty Years.
744	1,936	726	10,025	2,661	WOLSTANTON	2,561	8,804	727	1,757	719
1,146	2,072	979	10,008	3,220	Bristol -	2,702	8,987	742	1,858	794
643	1,465	589	10,203	3,161	Hull -	2,865	9,261	525	1,323	523
913	2,094	838	10,497	2,852	Birmingham	2,601	9,304	699	1,913	706
632	2,072	731	12,050	3,100	Wolverhampton	2,941	10,680	692	2,132	607
1,060	2,009	905	13,539	3,487	Manchester	3,093	11,833	816	1,695	906
914	1,913	817	12,047	3,271	Leeds - -	2,982	10,930	718	1,843	727

Comments on Table XLIII.

The children of Wolstanton die from all causes, at a rate not very different in proportion to their numbers from those of Bristol, and not much less than those of Hull and Birmingham. The pulmonary death-rate of the children of Wolstanton is considerably higher than the pulmonary death-rate of the children of Hull, and does not differ essentially from the rate of mortality from pulmonary affections sustained by the children of Bristol, Birmingham, Wolverhampton, Manchester, and Leeds.

6. *TEXTILE MANUFACTURES.*

6. TEXTILE MANUFACTURES. The pulmonary death-rate is usually excessive in towns where both males and females are largely employed in the manufacture of textile fabrics, but the difference in the mortality of the sexes is rarely great; sometimes it is the male, at others the female death-rate, which is in excess. The mortality has been investigated in twenty-seven textile manufacturing districts, and will be most conveniently considered in sections, arranged according to the material employed in the special manufacture of each, viz.:—*a.* Woollen manufacture; *b.* Silk manufacture; *c.* Linen and flax manufacture; *d.* Cotton manufacture; and *e.* The manufacture of hosiery and lace.

(a) *Woollen manufacture.*

Leeds.

Dust given off in wool-combing, cloth-dressing, and shoddy-grinding.

(a) *Woollen Manufacture.* With the single exception of Leeds, the mortality in the districts of woollen manufacture is rather below what prevails in the cotton and silk districts. Leeds must be viewed rather as a great town, and its inhabitants as suffering from causes apart from any prevalent occupation, because the proportion of operatives employed in the woollen manufacture is only small. More females, indeed, are employed in the manufacture of flax and linen than of woollen fabrics. Still that there is something prejudicial in some of the processes of the woollen manufacture seems not unlikely. A good deal of dust is given off in certain stages of the manufacture, and especially in wool-combing and cloth dressing. Shoddy grinders, that is, persons employed in mills where old woollen rags are torn to pieces by a machine for the purpose of being manufactured, with the addition of new wool, into yarn, are also exposed to the inhalation of dust, and suffer in consequence from a complaint known as the shoddy fever, and characterised by head-ache, sickness, dryness of the throat, difficulty of breathing, cough, and expectoration. It is by Thackrah that the operatives in these departments are subject to chronic bronchitis and asthma. This view is supported by the subjoined analysis of the mortality at different periods of life,

TABLE XLIV. *Pulmonary death-rates at different ages in Leeds.*

Death-rates from Pulmonary Affections per 100,000 Males.			Name of District.	Death-rates from Pulmonary Affections per 100,000 Females.		
Above Twenty Years.	Under Five Years.	At all Ages.		At all Ages.	Under Five Years.	Above Twenty Years.
914	1,913	817	Leeds - - -	718	1,843	727

from which it appears that the excess of the male over the female mortality at the adult period of life is nearly twice as great as the excess for the whole of life.

TABLE XLV. *Male and female pulmonary death-rates in districts of* WOOLLEN MANUFACTURE, *with the population-density, and the proportion of paupers and of men and women engaged in woollen manufacture.*

Per-centage of adult Men engaged in		Death-rate from Pulmonary Affections per 100,000 Males.	Name of District.	Death-rate from Pulmonary Affections per 100,000 Females.	Per-centage of adult Women engaged in Woollen Manufacture.	Urban Per-centage of Population.	Persons per Square Mile.	Persons per House.	Proportion of Paupers per 1,000 Persons.
Agriculture.	Woollen Manufacture.								
22·7	20·8	511	Stroud *a* -	511	25·1	23	547	4·4	62
8·6	37·3	547	Halifax *b* -	564	20·4	28	1,495	5·1	36
9·4	47·5	550	Huddersfield *c*	550	13·5	25	1,191	5·2	33
17·3	28·0	578	Kidderminster *d* -	544	6·0	65	564	4·9	43
5·8	41·9	611	Bradford *e* -	603	30·0	57	2,887	5·2	20
15·7	30·0	626	Melksham *f* -	559	28·6	69	678	4·8	102
7·4	18·3	630	Rochdale *g* -	588	7·7	40	1,150	5·1	34
2·5	16·8	817	Leeds *h* -	718	3·5	100	30,886	4·8	48
26·5	—	569	ENGLAND AND WALES *i* -	535	—	50	307	5·5	—

a Stroud. Woollen cloth.

b Halifax. Worsted, woollen cloth, carpets and rugs, and stuff. 3·7 per cent. of the men and 2·0 per cent. of the women are employed in cotton manufactures.

c Huddersfield. Woollen cloth and worsted manufactures, clothiers, &c. 3·4 per cent. of the men are miners and iron manufacturers. 1·9 per cent. of the men and 1·8 per cent. of the women are employed in cotton manufactures.

d Kidderminster. Carpets and rugs.

e Bradford (in Yorkshire). Worsted, woollen cloth, and stuff manufactures, clothiers. 1·0 per cent. of the men are engaged in cotton manufactures, 1·7 per cent. are machine makers, and 6·0 per cent. are miners and iron manufacturers.

f Melksham. Woollen cloth.

g Rochdale. Woollen cloth. 19·2 per cent. of the men and 19·8 per cent. of the women are engaged in cotton manufactures. 4·8 per cent. of the men are miners and iron manufacturers.

h Leeds. Woollen cloth. 2·0 per cent. of the men and 4·4 per cent. of the women are engaged in the manufacture of flax and linen. 2·4 per cent. of the men are machine makers.

i England and Wales. 7·1 per cent. of the men and 5·6 per cent. of the women are employed in the manufacture of textile fabrics.

Comments on Table XLV.

The male exceeds the female death-rate in all the places, excepting Halifax, where the female is higher than the male death-rate, and Stroud and Huddersfield, where the sexes die at an equal rate from pulmonary diseases. With the single exception of Melksham, the differences in the mortality of the sexes are inconsiderable in the chief seats of the woollen manufacture. Beyond the fact already noticed, that the adult male pulmonary death-rate is excessive in Leeds, nothing as to the influence of the woollen manufacture on health can be deduced from the present series of facts. Possibly, a minute investigation of the death-losses at the several periods of life in the other places might have furnished more positive results.

(b) *Silk manufacture.*

(b) *Silk Manufacture.* The great diversity in the death-rates of the sexes is the first circumstance that strikes the eye in looking at the annexed table of pulmonary death-rates in several districts of silk manufacture. The male is higher than the female pulmonary death-rate in Norwich, Derby, and Coventry; the female much higher than the male pulmonary death-rate in Leek and Macclesfield. The male death-rate in each place being considered as 100, the female death-loss would be 86·6 in Coventry, 93·6 in Norwich, 99·0 in Derby, 116·3 in Macclesfield, and 119·0 in Leek. Silk and ribbon are the special manufactures of Derby, but the proportion of operatives employed in them is not large. In Norwich more men are employed in shoemaking than in the silk manufacture. The number of operatives employed in the latter form of industry is indeed too small to produce any great effect upon the general death-rate, even supposing the manufacture of silk to be prejudicial to health. Watch-making employs a considerable number of the men of Coventry, but a very large proportion both of the men and women are employed in the manufacture of ribbons and silk. Macclesfield and Leek, next to Coventry, are the two districts in which the largest proportion both of men and women are employed in the silk manufacture; they are therefore the districts in which we should expect most obviously to observe the influence of silk manufacture on health. In both places a considerable number of females are employed in the prevalent occupation, and in both places also the female considerably exceeds the male death-rate. The excess for the whole

Comments on Table XLVI.

TABLE XLVI. *Male and female pulmonary death-rates in districts of* SILK MANUFACTURE, *with the population-density, the proportion of paupers and of men and women engaged in the manufacture of silk.*

Per-centage of adult Men engaged in		Death-rate from Pulmonary Affections per 100,000 Males.	Name of District.	Death-rate from Pulmonary Affections per 100,000 Females.	Per-centage of adult Women engaged in Silk Manufacture.	Urban Per-centage of Population.	Persons per Square Mile.	Persons per House.	Proportion of Paupers per 1,000 Persons.
Agriculture.	Silk Manufacture.								
5·4	9·2	555	Norwich *a* -	520	7·5	100	10,091	4·5	*
37·4	14·9	588	Leek *b* - -	705	17·2	38	202	5·0	30
3·3	11·4	645	Derby *c* - -	639	13·7	93	9,413	4·9	9
3·7	34·0	661	Coventry *d* -	573	44·1	100	4,292	4·7	*
18·9	31·0	691	Macclesfield *e* -	804	26·0	62	497	4·9	27
26·5	—	569	ENGLAND AND WALES *f*	535	—	50	307	5·5	—

a Norwich. 11·0 per cent. of the men are shoemakers and 2·6 per cent. are worsted manufacturers. 3·2 per cent. of the women are shoemakers.

b Leek. 6·9 per cent. of the men are miners.

c Derby. The manufactures are silk and ribbons.

d Coventry. The manufactures are ribbons and silk. 11·3 per cent. of the men are watchmakers.

e Macclesfield. 3·5 per cent. of the men and 3·1 per cent. of the women are engaged in the cotton manufacture. 4·0 per cent. of the men are miners.

f England and Wales. 7·1 per cent. of the men and 5·6 per cent. of the women are employed in the manufacture of textile fabrics.

* No return.

of life is nearly equal in the two districts; but it is greatest in adult life among the women of Macclesfield, where a much larger number are engaged in this industrial employment. In Leek the pulmonary death-rate of adult women exceeds that of adult men in the proportion of 82 per 100,000. In Macclesfield the pulmonary death-rate of women exceeds that of men in the proportion of 148 per 100,000. The general death rate of children is high in both places, and the pulmonary mortality under five years of age is in accordance with the high death-rate from all causes. The high death-rates of children show the existence of unhealthy influences which affect the entire population, but the excess of the female death-rates also shows that the women are acted upon by some special cause of ill health.

TABLE XLVII. *Death-rates from all causes and from pulmonary affections at different ages in Leek and Macclesfield.*

Death-rates. Male, per 100,000.				Name of District.	Death-rates. Female, per 100,000.			
Pulmonary Affections.			All Causes.		All Causes.	Pulmonary Affections.		
All Ages.	Under Five Years.	Above Twenty Years.	Under Five Years.		Under Five Years.	All Ages.	Under Five Years.	Above Twenty Years.
588	1,157	666	7,266	Leek . .	6,170	705	1,165	748
691	1,544	722	9,036	Macclesfield	7,602	804	1,342	870

(c) *Linen and flax manufacture.*

(c) *Linen and Flax Manufacture.* There are among the selected districts none in which the linen and flax manufactures occupy so prominent a position in the industrial occupations of the people as that held by woollen manufactures in Bradford and Melksham, or by silk in Leek and Macclesfield. A small proportion of the operatives in several places, as for example, in Leeds, are employed in the flax or linen manufacture, but this is so intermixed with other industrial employments, and is in itself so small in amount, as to render it impossible to estimate the influence of the occupation on health. The injury to health sustained by operatives in flax has long been known, and arises from the same cause as the asthma of lead miners and the grinders' rot,—the inhalation of an atmosphere charged with dust, which irritates the bronchial membrane, leading to bronchitis and its consequences, emphysema and bronchial phthisis. Knaresborough

TABLE XLVIII. *Male and female pulmonary death-rates in* KNARESBOROUGH *and* PATELEY BRIDGE, *with the population-density, the proportion of paupers and of men and women engaged in the* LINEN MANUFACTURE.

Per-centage of adult Men engaged in		Death-Rate from Pulmonary Affections per 100,000 Males.	Name of District.	Death-Rate from Pulmonary Affections per 100,000 Females.	Per-centage of adult Women engaged in Flax and Linen Manufacture.	Urban Per-centage of Population.	Persons to a Square Mile.	Persons to a House.	Proportion of Paupers per 1,000 Persons.
Agriculture.	Flax and Linen Manufacture.								
40·7	5·1	465	Knaresborough	451	0·9	33	205	4·6	28*
46·5	15·5	508	Pateley Bridge[a]	391	8·4	0	72	4·8	58
26·5	—	569	ENGLAND AND WALES[b] -	535	—	50	307	5·5	—

[a] Pateley Bridge. 9·5 per cent. of the men are engaged in lead mining.
[b] England and Wales. 7·1 per cent of the adult men and 5·6 per cent. of the adult women are employed in the manufacture of textile fabrics.
* Average for one year.

and Pateley Bridge are the only two places amongst those to which the inquiry has extended in which the flax and linen manufacture forms a prominent feature in the occupations of the people, and the proportion in both is too small to afford any trustworthy conclusions. The high male pulmonary death rate of Pateley Bridge is probably to be ascribed quite as much to the circumstance that 9·5 per cent. of the adult men are employed in lead-mining as to the fact that upwards of 15 men in each 100 are engaged in the flax manufacture. The natural position of Pateley Bridge is salubrious, it is remote from ordinary urban influences, and the people, chiefly of the agricultural class, are sparsely distributed on the surface of the earth, at the rate of only 70 to a square mile. Probably the pulmonary mortality of Pateley Bridge would have been small but for the influence exerted on its public health by the occupations of the inhabitants. This example may serve at least to show that other influences act on the public health, besides those which have been, not perhaps too prominently, but certainly too exclusively, put forward as the alpha and omega of sanitary requirements.

(d) *Cotton manufacture.*

(d) *Cotton Manufacture.* The pulmonary death-rates of seven towns and of one rural district in which the cotton manufacture forms the staple industrial employment of the people have been investigated. The mortality in Garstang is moderate, but nearly two thirds of the adult men are employed in the cultivation of the earth, and the proportion either of men or women employed in factory labour is exceedingly small. The death-rates are high in all the other places in the table.

TABLE XLIX. *Male and female pulmonary death-rates in districts of* COTTON MANUFACTURE, *with the population-density, the proportion of paupers and of men and women engaged in cotton manufacture.*

Per-centage of adult Men engaged in		Death-Rate from Pulmonary Affections per 100,000 Males.	Name of District.	Death-Rate from Pulmonary Affections per 100,000 Females.	Per-centage of adult Women engaged in Cotton Manufacture.	Urban Per-centage of Population.	Persons per Square Mile.	Persons per House.	Proportion of Paupers per 1,000 Persons.
Agriculture.	Cotton Manufacture.								
63·5	4·4	373	Garstang . .	442	7·2	0	130	5·3	59
13·5	14·9	598	Wigan *a* . .	644	18·0	50	1,055	5·5	50
7·4	19·2	630	Rochdale *b* .	588	19·8	40	1,150	5·1	34
7·7	42·6	708	Blackburn *c* .	734	34·9	58	1,333	5·7	38
4·4	11·0	728	Chorlton *d* .	646	9·6	84	6,863	5·3	19
3·1	14·4	766	Salford *e* . .	705	10·1	97	11,597	5·5	32
14·2	30·7	776	Preston . .	768	28·4	75	908	6·0	55
2·1	18·6	905	Manchester *f* .	816	14·9	93	11,577	6·2	49
26·5	—	569	{ ENGLAND AND WALES *g* }	535	—	50	307	5·5	—

a Wigan. 26·0 per cent. of the men are coal-miners.

b Rochdale. 18·3 per cent. of the men and 7·7 per cent. of the women are employed in the woollen manufacture; 4·8 per cent. of the men are miners and iron manufacturers.

c Blackburn. 2·7 per cent. of the men are miners.

d Chorlton. 5·8 per cent. of the men are machine makers.

e Salford. 3·3 per cent. of the men are machine makers, and 3·2 per cent. of the women are engaged in the manufacture of silk.

f Manchester. 2·4 per cent. of the men and 3·5 per cent. of the women are employed in the silk manufacture, 3·4 per cent. of the men are machine makers, and 2·1 per cent. of the women are engaged in the woollen manufacture.

g England and Wales. 7·1 per cent. of the adult men and 5·6 per cent. of the adult women are employed in the manufacture of textile fabrics.

Comments on Table XLIX.

Although it has a larger proportion of agricultural labourers, and a smaller proportion of urban residents among its population than several places where the death-rates are lower, Preston stands next to Manchester in respect of pulmonary insalubrity. The aggregation of the inhabitants of Preston upon the surface of the soil is much less dense than that of Chorlton and Salford, but the proportion of paupers in the population of Preston is greater than in either of the other places. The female exceeds the male death-rate in Wigan and Blackburn, and is scarcely appreciably less than the male death-rate in Preston. A larger per-centage of women are employed in the cotton manufacture in these three towns than in any of the others in the table. Including the women employed in the woollen and silk manufactures of Manchester, as well as those employed in the cotton manufacture, 20·5 per cent. of the adult females of Manchester are engaged in the special manufactures of that city. This is by no means a large proportion, yet on comparing the pulmonary death-rates of the sexes in Manchester with those of Birmingham and Liverpool it is found that the difference between the pulmonary death-rates of adult men and women is less in Manchester than in either of the other towns. The difference in the death-rates of the sexes is very considerable in Liverpool, where the women follow no special occupation; less in Birmingham, where 7·1 per cent. of the adult women are employed in the manufacture of metals; least in Manchester, where 20·5 per cent. of the adult females are employed in manufactures. Assuming the adult male pulmonary death-rate of each place to be 100, the adult female death-rate of Manchester would be 85·4, of Birmingham 77·3, and of Liverpool 72·7. Another fact shown in the table tends also to the conclusion that factory labour is unfavourable to health. It is, that whilst the pulmonary mortality of Manchester is, in both sexes, lower than the pulmonary mortality of Liverpool for the whole of life, it is higher in both sexes for adult life. Here again the influence of female occupation seems apparent, for the excess of the adult female death-rate of Manchester from pulmonary affections over that of Liverpool is very much greater than the excess of the male adult death-loss. Thus, whilst both Manchester and Liverpool sustain a high pulmonary mortality, the causes of this mortality fall with unequal severity upon the different periods of life. The exciting causes of the high pul-

TABLE L.
Death-rates from pulmonary affections at different ages in Manchester, Birmingham, and Liverpool.

Death-rates from Pulmonary Affections per 100,000 Males.			Name of District.	Death-rates from Pulmonary Affections per 100,000 Females.		
Above Twenty Years.	Under Five Years.	All Ages.		All Ages.	Under Five Years.	Above Twenty Years.
1,060	2,009	905	Manchester .	816	1,695	906
913	2,094	838	Birmingham .	699	1,913	706
1,044	3,092	1,062	Liverpool . .	939	2,364	759

Apparent influence of working in cotton factories on the pulmonary death-rates.

monary death-loss of Liverpool seem common to all ages, and therefore act with proportionably greater force upon the delicate and feeble constitution of young children. In Manchester, although probably similar causes are in operation, they are less powerful than in Liverpool, for the infantile pulmonary mortality as well as the infantile mortality from all causes, is less than in Liverpool; but other influences are also at work among the adult population of Manchester which aggravate the pulmonary mortality at a more advanced period of life.

(e) *The manufacture of hosiery and lace.*

Comments on Table LI.

(e) *The Manufacture of Hosiery and Lace.*—Most of the places in which hosiery and lace are manufactured sustain a high pulmonary mortality. The female exceeds the male pulmonary death-rate in Belper, Basford, and Radford. In Hinckley, where about an equal proportion of men and women are employed in the manufacture of hosiery, the male is somewhat higher than the female death-rate. In Leicester and Nottingham the male very considerably exceeds the female death-rate. Nottingham and Leicester must in fact, as regards the proportion of deaths caused by chest affections, be classed amongst unhealthy places. The population of both places is dense, and the proportion of agricultural labourers small. There are, however, other town districts as purely urban in character in which the density of the population does not differ materially from Leicester and Nottingham, but which present a lower pulmonary death-rate. The population of Hull is rather smaller, that of Norwich somewhat larger, than the population of Nottingham and Leicester. The density of the inhabitants of Hull measured by their distribution upon the face of the earth is very considerable, but not quite so great as prevails in Nottingham, but the density both of Hull and Norwich is greater than the density of Leicester, yet the pulmonary death-rates of Hull and Norwich fall considerably below the pulmonary death-rates of Nottingham and Leicester.

TABLE LI. *Male and female pulmonary death-rates, with the population-density, the proportion of paupers and of men and women engaged in the* MANUFACTURE *of* HOSIERY *and* LACE.

Per-centage of adult Men engaged in		Death-rate from Pulmonary Affections per 100,000 Males.	Name of District.	Death-rate from Pulmonary Affections per 100,000 Females.	Per-centage of adult Women engaged in the Manufacture of Hose.	Urban Per-centage of Population.	Persons per Square Mile.	Persons to a House.	Proportion of Paupers per 100,000 Persons.
Agriculture.	Manufacture of Hose.								
20·8	9·6	468	Belper *a* . .	558	5·2	27	450	4·9	27
19·6	24·6	508	Basford *b* .	577	16·9	0	472	5·0	42
23·7	43·7	652	Hinckley . .	603	42·5	39	411	4·6	73
5·1	17·6	664	Radford *c* .	672	6·7	0	2,520	4·9	25
3·9	27·2	740	Leicester *d* .	659	10·9	100	9,801	4·7	54
3·3	16·4	813	Nottingham *e* .	703	8·6	98	19,994	5·0	47
26·5	—	569	ENGLAND AND WALES *f*	535	—	50	307	5·5	—

a Belper. 9·8 per cent. of the men are coal miners; 5·4 per cent. of the women are employed in the manufacture of cotton and lace.

b Basford. 10·8 per cent. of the men are coal miners; 5·5 per cent. of the men and 3·8 per cent. of the women are lace manufacturers.

c Radford. 25·4 per cent. of the men and 18·6 per cent. of the women are employed in the manufacture of lace.

d Leicester. 3·3 per cent. of the men are woollen manufacturers.

e Nottingham. 9·3 per cent. of the men and 17·8 per cent. of the women are employed in the manufacture of lace.

f England and Wales. 7·1 per cent. of the adult men and 5·6 per cent. of the adult women are employed in the manufacture of textile fabrics.

TABLE LII*. *Comparison of the pulmonary death-rates and other circumstances of* NORWICH, HULL, LEICESTER, *and* NOTTINGHAM.

Population.	Urban Per-centage of Population.	Persons per Square Mile.	Per-centage of adult Men engaged in Agriculture.	Name of District.	Death-Rates from Pulmonary Affections.	
					Males per 100,000.	Females per 100,000.
68,195	100	10,091	5·4	Norwich . .	555	520
50,670	100	17,750	1·6	Hull . . .	589	525
60,642	100	9,801	3·9	Leicester . .	740	659
58,419	98	19,994	3·3	Nottingham .	813	703

Coventry, Derby, Portsea, and Worcester are other urban districts which likewise contrast favourably with Nottingham and Leicester as regards their death-rates from pulmonary affections.

7. MANUFACTURE OF SHOES.

7. MANUFACTURE OF SHOES.—The three districts, Wellingborough, Northampton, and Stafford, are remarkable for the large number of men employed in the manufacture of shoes. The occupation is sedentary, and when too closely followed it is conducive to gastric affections, but does not appear from the figures in the table to be particularly injurious to the lungs.

TABLE LII. *Male and female pulmonary death-rates, with the population-density, the proportion of paupers and of men and women engaged in* SHOEMAKING.

Per-centage of adult Men employed in		Death Rates from Pulmonary Affections per 100,000 Males.	Name of District.	Death Rate from Pulmonary Affections per 100,000 Females.	Per-centage of adult Women engaged in Shoemaking.	Urban Per-centage of Population.	Persons per Square Mile.	Persons per House.	Proportion of Paupers per 1,000 Persons.
Agriculture.	Shoemaking.								
37·1	26·2	449	Wellingborough *a*	531	2·5	24	246	4·7	71
14·1	33·7	564	Northampton *b*	534	3·9	79	1,037	5·2	39
32·0	20·3	579	Stafford . .	554	7·1	52	280	5·5	29
26·5	3·7	569	ENGLAND AND WALES .	535	0·4	50	307	5·5	—

a Wellingborough. 20·2 per cent. of the women are employed in the manufacture of lace.
b Northampton. 2·8 per cent. of the women are employed in the manufacture of lace.

These three towns hold an intermediate position between the purely agricultural and the smaller manufacturing towns, as regards the proportion of mortality from pulmonary diseases. Notwithstanding that few females are employed in the special manufacture, the death-rates of the two sexes differ but little in Northampton and Stafford. In Wellingborough, where 20·2 per cent. of the women are employed in the manufacture of lace, the female very considerably exceeds the male pulmonary death-rate.

Influence of female industrial occupation on female pulmonary death-rates.

I have already had occasion to remark the high female death-rates from pulmonary diseases in districts where the women are employed in the manufacture of lace, whilst the men are chiefly engaged in the cultivation of the earth. Here then is another example of the like kind, excepting that, instead of being engaged in the cultivation of the earth, a large per-centage of the men of Wellingborough are employed in a special industrial occupation. It is indeed most remarkable that the female so frequently exceeds the male pulmonary death-rate in places where the women are much employed in special forms of manufacture. Several examples of the kind have been referred to under each head of this section, and some of the more obvious are here grouped together, that they may be studied in juxtaposition.

TABLE LIII. *Male and female pulmonary death-rates, with the proportion of men and women engaged in manufactures in places remarkable for the industrial employment of women.*

Per-centage of adult Men engaged in		Death-rate from Pulmonary Affections per 100,000 Males.	Name of District.	Death-rate from Pulmonary Affections per 100,000 Females.	Per-centage of adult Women engaged in Manufactures.	Nature of Female Occupation.
Agriculture.	Manufactures.					
48·6	0·	419	Bedford . .	527	25·3	Lace.
52·3	0·	430	Newport Pagnell	545	33·3	Lace.
37·1	26·2	449	Wellingborough .	531	20·2	Lace.
49·5	0·	475	Towcester . .	573	26·7	Lace.
19·6	29·6	508	Basford . .	577	20·7	Hosiery and Lace.
5·1	43·0	664	Radford . .	672	25·3	Lace and hose.
40·2	2·6	491	Berkhampstead .	566	28.9	Straw-plait.
35·0	8·2	523	Yeovil . .	591	29·0	Gloves.
13·5	14·9	598	Wigan . .	644	18·0	Cotton.
7·7	42·6	708	Blackburn . .	734	34·9	Cotton.
37·4	14·9	588	Leek . . .	705	17·2	Silk.
18·9	34·5	691	Macclesfield .	804	29·1	Silk.
26·5	13·7	569	ENGLAND AND WALES *a* .	535	7·1	

a England and Wales.—All kinds of manufactures are included in the per-centage here given.

B. CONTAGIOUS DISEASES. (a) *Small-pox.*

B. CONTAGIOUS DISEASES. (a) *Small-pox.* The death-rate of small pox varies in different districts from a small fraction up to 145 per 100,000 persons of both sexes and all ages. The highest proportion of deaths occurs in certain districts of the south and west of England. The male exceeds the female small-pox death-rate in England and Wales, in the several great registration divisions, and, with the exception of Worcestershire and Monmouthshire, in which the male and female death-rates are equal, in the several counties to which this investigation has extended.

The subjoined table shows the proportion of deaths produced by small-pox in the several divisions and counties arranged in the order of the male death-rates.

TABLE LIV. *Male and female* SMALL-POX *death-rates in the Divisions and Counties.*

Name of District.	Death-rates.		Name of District.	Death-rates.	
	Male per 100,000.	Female per 100,000.		Male per 100,000.	Female per 100,000.
Eastern Counties .	16	14	West Midland Counties . . .	35	30
South Midland Counties . . .	22	18	Northern Counties .	36	31
South-eastern Counties . . .	23	18	Yorkshire . .	36	33
North Midland Counties . . .	25	23	Monmouthshire and Wales . . .	36	33
North-western Counties . . .	28	25	South-western Counties . . .	38	32
ENGLAND AND WALES . . .	31	27	London . . .	40	31
Lincolnshire . .	11	10	North Wales . .	30	25
Herefordshire . .	14	10	Gloucester . .	33	25
Buckinghamshire .	14	11	Cheshire . .	34	33
Northamptonshire .	20	17	Nottinghamshire .	35	34
Leicestershire . .	21	19	Monmouthshire .	37	37
Hertfordshire . .	23	17	South Wales . .	39	37
Bedfordshire . .	24	19	West Riding . .	40	38
Worcestershire .	24	24	Warwickshire .	42	35
Lancashire . .	27	24	Staffordshire . .	44	41
Cambridgeshire .	28	27	Durham . . .	48	45
Cumberland . .	29	22	Cornwall . .	53	43
Northumberland .	29	24			

Comments on Table LIV.

Divisions.

Taking England and Wales as the standard of comparison, the death-rates are below the standard in five and exceed it in six of the great divisions. The male mortality is highest in London, but the mean mortality in both sexes is highest in the south-western counties. The lowest mortality is presented by the eastern counties, where the small-pox death-rate is very nearly fifty per cent. below the small-pox death-rate of England and Wales.

Counties.

The mortality in the counties varies to an even greater extent than that of the larger divisions. The death-rates of Staffordshire, Durham, and Cornwall from small-pox are more than four times as high as the death-rate of Lincolnshire. Lancashire, which among the counties presents the highest general death-rate, has a lower small-pox death-rate than either Cambridgeshire, Cumberland, North Wales, or Cornwall, in each of which the general death-rate is considerably lower than the general death-rate of Lancashire.

Registration districts.

The mortality in some of the registration districts is exceedingly small; in several it is very large. Sometimes, no doubt, this arises from the occurrence of epidemic outbreaks in some places, and the immunity of others; but there are also great differences in the mortality of places from which small-pox has rarely been absent during the period comprised in the investigation, as Plymouth, Merthyr Tydfil, Bradford, Liverpool, Newcastle-on-Tyne, Manchester, Salford, and Chorlton. Reeth, Blofield, and Romney Marsh lost none of their inhabitants from small-pox during the seven years; in Bootle and Garstang 1 person each; in Richmond 2; in Alston, Builth, and Haltwhistle 3 each; in Cranbrook 4; and in Hendon and Berkhampstead 5 persons each died during the seven years. From data so small it is quite certain that no reliable inference can be deduced. Wherever small-pox has produced an appreciable influence on the mortality,

Table LV.
Male and female small-pox *death-rates in Registration districts.*

Average Annual Proportion of Deaths from Small-pox during the Septennial Period 1848-54 in the under-mentioned Registration Districts.

Name of District.	Male per 100,000.	Female per 100,000.	Name of District.	Male per 100,000.	Female per 100,000.
East Stonehouse .	196	96	Nottingham . .	42	38
Plymouth . .	136	123	Stoke-upon-Trent .	40	38
Penzance . .	115	95	Northampton .	39	38
Portsea . . .	105	97	Birmingham . .	39	36
Merthyr Tydfil .	103	101	West Derby . .	30	23
Redruth . .	95	74	Manchester . .	29	23
Derby . . .	86	67	Huddersfield . .	28	28
Bristol . . .	80	63	Tynemouth . .	28	17
Sheffield . .	73	78	Preston . . .	22	22
Luton . . .	72	55	Salford . . .	21	19
Wolverhampton .	69	63	Glendale . .	19	19
Wrexham . .	69	58	Chorlton . .	18	14
Coventry . .	65	62	King's Norton .	13	13
Gravesend . .	64	40	Saffron Walden .	10	10
Swansea . . .	60	53	Bedford . . .	9	4
Leeds . . .	57	50	Kidderminster .	8	11
Hull . . .	55	46	Berkhampstead .	7	7
Bradford . .	51	45	Stroud . . .	6	11
Belper . . .	50	57	Newport Pagnell .	6	5
Norwich . .	49	41	Hendon . . .	5	7
Newcastle-on-Tyne	48	47	Spalding . .	5	3
Liverpool . .	45	37	Lewes . . .	5	3

Epidemics of small-pox.

it has prevailed more or less in an epidemic form. This has been the case even in those places from which it has rarely or never been absent. Thus in Manchester, Salford, and Chorlton there was more or less mortality from small-pox in each of the seven years, but a general outbreak appears to have taken place in 1851. Out of 681 deaths that occurred in these three adjacent districts during the septennial period, 297 occurred in 1851. The same may be said of Liverpool and West Derby, in both of which small-pox caused an appreciable annual mortality, but was most fatal in 1851, when it carried off 395 persons from the two districts. In Leeds, Sheffield, and Bradford there were a good many deaths in most years; but 1850, when 195 persons succumbed to the disease in Bradford, and 1852, when it was fatal to 168 persons in the same town, were the most fatal years. In Merthyr Tydfil and Swansea there were two epidemic visitations during the seven years. In Merthyr Tydfil, 1848 and 1851, 52, and 53, and in Swansea, 1848 and 1852 and 53, were the most fatal years. Small-pox was most prevalent in Redruth in the years 1849, 50, 51, and 52. There were deaths in Plymouth every year, but the four years 1848, 49, 52, and 54 were particularly fatal. In Gravesend one-half of the deaths were in 1852. In Penzance, out of 393 deaths, 246 occurred in 1851.

There are other districts to which small-pox paid one or more visits during the seven years, and caused only an insignificant mortality at other periods. Thus out of 163 deaths that occurred in Ipswich during the seven years, 91 took place in 1848–49, and 68 in 1854. In Norwich 198 out of 212 deaths were in 1853–54. Out of 89 deaths in Yeovil during the seven years, 78 occurred in the single year 1849. All the deaths in Spalding occurred in one year; all those in Kidderminster and Worcester in two separate visitations, occupying three out of the seven years. In Leominster 22 out of 24 deaths, and in Whittlesey 25 out of 26 deaths, were in single years. In Luton 99 deaths out of 110 were in a single year; in Northampton 88 out of 91 deaths occurred in two successive years. In Wolverhampton, the total number of deaths produced by small-pox during the septennial period amounted to 482, whereof 438 were in 1850–51.

Comparative mortality of the sexes.

The male death-loss during the seven years was higher in proportion to the relative numbers of the two sexes resident in each place in seventy-nine districts; the female was highest in twenty-one districts. It is perhaps not unimportant to note that in ten of the districts in which the female exceeds the male mortality from small-pox, the female are also higher than the male death-rates from pulmonary affections. Of the eleven remaining districts, several are places in which the mortality either was remarkably small or was chiefly limited to one or two years. It may, therefore, be inferred that, excepting under peculiar circumstances, small-pox is normally more fatal to males than to females.

Neglect of vaccination

Of all diseases, small-pox is perhaps that the mortality of which is the most certainly under the control of art. In the practice of vaccination we possess a means of prevention, the universal employment of which might indeed fail altogether to extirpate small-pox, but would at least, as has been well said, "render deaths by small-pox among the rarest entries in the "register." The irregular and inefficient manner in which this important sanitary precaution is often performed may be learnt by comparing the mortality of Plymouth, Penzance, Portsea, Merthyr Tydfil, Redruth, and other places, which present a high death-rate from small-pox, with the mortality of Newcastle-on-Tyne, Liverpool, Nottingham, Northampton, Birmingham, Manchester, Tynemouth, Salford, and Chorlton, in each of which the number of deaths in proportion to the population is considerably less than half, in several instances less than a third, of the small-pox death-rates of the former places. There can be no doubt that the regular and efficient performance of vaccination on every child would almost entirely annihilate the mortality occasioned by small-pox, even in those places in which the mortality is smallest. The loss of life by small-pox is indeed small in comparison with what it was prior to the introduction of vaccination, but during the seven years comprised in the present inquiry upwards of 36,400 deaths were produced by small-pox in England and Wales. Most of these deaths would have been prevented had there been a perfect system of vaccination.

in certain districts.

(b) *Measles and hooping-cough.*

(b) *Measles and hooping-cough* often prevail at the same period, very frequently follow each other immediately in the same subject, and when fatal are each most commonly so from pulmonary complication.

Measles.

Measles is most fatal in the male sex in England and Wales, and in ten of the eleven great registration divisions. The difference in the mortality of the sexes is usually small, being largest in London, where the deaths in each 100,000 males of all ages being 50, the female deaths, also in each 100,000 females of all ages, are 42. The female exceeds the male death-rate by one death in each 100,000 of either sex respectively in Monmouthshire and Wales. Out of twenty-three registration counties for which the death-rates have been computed, the male death-rate produced by measles exceeds the female death-rate from the same disease in seventeen, is equal to the female death-rate in three, and inferior to it in the remaining three. The male death-rate being considered as 100, the female death-rate in England and Wales would be 95. In London the male death-rate being 100, the female would be 84. Staffordshire and Lancashire among the counties present the highest death-rates from measles. Herefordshire, North Wales, and Bedfordshire present the lowest death-rates. The death-rates of Lancashire and Staffordshire from measles are each more than three times as much per 100,000 persons as the death-rates of Bedfordshire and North Wales, and more than four times as much as the death-rate of Herefordshire. The widest difference in the death-rates of the sexes occurs in Herefordshire, the healthiest county, and in Gloucestershire, also a healthy county. The male death-rates of each county being assumed to be 100, the female death-rates of the following counties would be, Staffordshire 98, Lancashire 93, Bedfordshire 88, Herefordshire 83, Gloucestershire 81.

TABLE LVI. *Male and female death-rates from* HOOPING-COUGH, SCARLATINA, *and* MEASLES *in the Divisions and Counties.*

AVERAGE ANNUAL PROPORTION of DEATHS from ALL CAUSES, and from HOOPING COUGH, SCARLATINA, and MEASLES, in the Divisions and under-mentioned Counties of England and Wales, during the Septennial Period 1848–54.

Male per 100,000.				Name of District.	Female per 100,000.			
All Causes.	Hooping-cough.	Scarlatina.	Measles.		Measles.	Scarlatina.	Hooping-cough.	All Causes.
2,367	44	94	40	ENGLAND AND WALES.	38	87	53	2,209
2,740	85	117	50	London . .	42	96	90	2,353
2,071	32	62	21	South-eastern Counties.	20	60	41	1,960
2,135	33	60	28	South Midland Counties.	27	57	41	2,075
2,094	33	77	21	Eastern Counties.	19	74	39	2,024
2,103	37	78	26	South-western Counties.	23	69	42	1,965
2,396	32	89	47	West Midland Counties.	44	86	41	2,241
2,118	33	83	33	North Midland Counties.	32	81	40	2,081
2,795	56	141	67	North-western Counties.	63	127	68	2,572
2,444	39	99	51	Yorkshire .	50	102	48	2,321
2,299	40	88	41	Northern Counties.	39	82	50	2,187
2,222	40	90	25	Monmouthshire and Wales.	26	89	49	2,100
1,995	23	50	32	Hertfordshire .	27	48	33	1,890
2,102	34	56	26	Buckinghamsh.	23	53	39	2,169
2,141	36	74	37	Northamptonsh.	33	67	49	2,174
2,096	39	45	25	Bedfordshire .	22	38	48	2,065
2,181	37	67	31	Cambridgeshire	33	65	44	2,097
2,070	48	75	32	Cornwall . .	29	69	54	1,915
2,346	32	84	27	Gloucestershire	22	75	39	2,127
2,060	16	39	18	Herefordshire .	15	45	22	1,941
2,619	38	113	79	Staffordshire .	78	114	48	2,477
2,163	23	66	31	Worcestershire	28	66	24	2,011
2,472	38	92	45	Warwickshire .	44	86	48	2,328
2,219	34	64	45	Leicestershire .	44	60	42	2,169
1,945	31	92	26	Lincolnshire .	25	93	39	1,927
2,227	34	85	35	Nottinghamshire	35	85	41	2,161
2,392	38	127	43	Cheshire . .	40	109	48	2,267
2,877	59	144	72	Lancashire .	67	130	72	2,634
2,516	42	104	58	West Riding .	57	106	52	2,388
2,400	42	100	51	Durham . .	51	95	55	2,298
2,371	42	84	33	Northumberland	30	76	50	2,201
2,095	37	73	40	Cumberland .	37	62	45	2,027
2,398	44	86	33	Monmouthshire	35	102	56	2,214
2,284	39	80	25	South Wales .	25	75	47	2,127
2,048	39	107	21	North Wales	22	104	48	2,012

Hooping-cough.

Hooping-cough is more fatal to females than to males in England and Wales, in all the great registration divisions of the country, and in each of the twenty-three selected counties. The differences of the death-rates in the sexes are usually much greater than is the case with measles. The most striking exceptions are Worcestershire and London; the male death-rate in each of which being considered as 100, the female death-rate would be, Worcestershire 104, and London 106. Lancashire, Cornwall, Monmouthshire, Durham, the West Riding of Yorkshire, and Northumberland are the most fatal counties in the order in which they are here written. The male death-rate of each being assumed to be 100, the female death-rates would be, Lancashire 122, Cornwall 112, Monmouthshire 127, Durham 131, West Riding 123, Northumberland 119. Herefordshire, Worcestershire, and Hertfordshire are the three healthiest counties. The male death-rates being considered as 100, the female death-rates in these healthier counties would be, Herefordshire 137, Worcestershire 109, Hertfordshire 143. The deaths from hooping-cough in Lancashire are three times as many per 100,000 persons as the deaths in Herefordshire, and more than double the deaths in Worcestershire and Hertfordshire. The proportion of deaths from hooping-cough in Cornwall, Monmouthshire, Durham, the West Riding of Yorkshire, and Northumberland are nearly double the proportion of deaths in Worcestershire and Hertfordshire.

Absence of proportion between the general mortality and the death-rates of measles and hooping-cough.

The death-rates from measles and hooping-cough bear no *direct* ratio to the general death-rates. Cornwall, for example, suffers more severely from both diseases than Gloucestershire; Hertfordshire more severely than Herefordshire; Cumberland than Nottinghamshire; although the general death-rates of Gloucestershire, Herefordshire, and Nottinghamshire are higher than the general death-rates of Cornwall, Herefordshire, and Cumberland. As a rule, it may indeed be inferred that these complaints will be most fatal in an unhealthy population, and especially among the ill-fed classes, and amongst a population prone to suffer from pulmonary diseases. Thus London and the North-western counties are the great registration divisions in which pulmonary affections are fatal to the largest proportion of the population.* They are also the divisions in which measles and hooping-cough are the most fatal. So also Staffordshire, Lancashire, and the West Riding of Yorkshire among the counties are those the inhabitants of which perish in the largest proportion from pulmonary affections, and likewise from measles and hooping-cough.

Hooping-cough and measles not always equally fatal in the same places.

The death-rates from hooping-cough and measles are not always equally high in the same counties. Staffordshire, the county in which measles is most fatal, has not a higher mortality from hooping-cough than Bedfordshire, where measles is much less fatal, and where the general death-rate is one-fifth less than the general death-rate of Staffordshire. Although there is a considerable difference between the proportion of deaths produced by hooping-cough in those counties in which hooping-cough is most and those in which it is least fatal, these differences are smaller than the differences in the death-rates caused by measles in different places. This greater uniformity in the death-rates produced by hooping-cough than in those from measles is perhaps due to the circumstance that measles is most frequently fatal in persons already predisposed to pulmonary disease, whilst the fatal pulmonary complications of hooping-cough are more frequently a direct consequence of the special affection. It is but an evident truism to assert that even hooping-cough, however, is more likely to prove fatal in persons of impaired constitution.

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* I suspect that the higher mortality of hooping-cough in London (probably likewise in Manchester and Liverpool) depends on its being in these places more fatal to elder children, a supposition quite in accordance with the belief that the greater tendency to pulmonary affections is the cause of the increased mortality from hooping-cough in these places. In ENGLAND AND WALES out of 1,000 hooping cough deaths the numbers for the 1st and 2d year of life are respectively 402½ and 275, but in LONDON 319¼ and 323½. See "Papers relating to the History and Practice of Vaccination," by Mr. Simon, Medical Officer of the Board of Health, pp. xxxi-ii.

The absence of *definite* relation between the mortality occasioned by measles and hooping-cough and the general death-rate is well exemplified by some of the districts, the death-rates of which have been worked out in a more detailed manner. The death-rate of children under five years of age is usually a fair measure of the public health of a community. This is shown in the above table side by side with the mortality from the three principal contagious diseases. Redruth here contrasts unfavourably with Wolstanton and Macclesfield as regards the mortality from measles and hooping-cough, but most favourably in respect of the general death-rate of children under five years of age.

TABLE LVII.
Male and female death-rates from hooping-cough, scarlatina, and measles, and from all causes, in children under five years of age.

Death-rates. Male per 100,000.				Name of District.	Death-rates. Female per 100,000.			
All Ages.			Under 5 Years.		Under 5 Years.	All Ages.		
Hooping-cough.	Scarlatina.	Measles.	All Causes.		All Causes.	Measles.	Scarlatina.	Hooping-cough.
13	44	15	3,740	New Forest .	3,502	23	59	23
39	46	37	7,134	Towcester .	6,189	15	54	37
12	143	27	3,499	Glendale . .	3,173	17	113	31
15	18	7	3,704	Haltwhistle .	3,385	8	0	42
40	120	70	6,150	Easington .	5,513	68	93	57
20	43	50	6,581	Houghton-le-Spring.	5,561	54	64	31
71	63	57	6,950	Redruth . .	6,376	54	51	80
25	67	33	4,288	Alston , .	3,453	30	42	46
29	50	8	4,321	Reeth . .	3,376	21	34	25
63	119	15	6,100	Carnarvon .	6,171	26	118	65
85	121	107	14,938	Liverpool .	13,985	108	115	104
57	125	48	10,008	Bristol . .	8,987	34	105	65
37	92	61	10,203	Hull . .	9,261	63	94	49
55	119	60	10,497	Birmingham .	9,304	63	108	69
51	105	109	12,050	Wolverhampton	10,680	110	112	62
23	115	35	10,025	Wolstanton .	8,804	49	116	32
81	147	86	13,539	Manchester .	11,833	76	137	96
53	87	79	12,047	Leeds . .	10,930	82	77	68
46	114	47	9,036	Macclesfield .	7,602	34	82	59
76	93	34	7,266	Leek . .	6,170	36	92	72

The tendency of measles and hooping-cough to be more fatal in places where pulmonary affections are most fatal, as well as in the absence of any *definite* relation between the death-rates from the several diseases, is well seen in the district death-rates. Thus, in the annexed table the mortality from measles and hooping-cough

TABLE LVIII. *Male and female death-rates from pulmonary affections, and from hooping-cough, scarlatina, and measles.*

Death-rates. Male per 100,000.				Name of District.	Death-rates. Female per 100,000.			
Hooping-cough.	Scarlatina.	Measles.	Pulmonary Affections.		Pulmonary Affections.	Measles.	Scarlatina.	Hooping-cough.
66	144	69	973	East Stonehouse	527	50	109	71
70	156	89	704	Stoke Damerel .	525	86	105	65
71	138	68	657	Plymouth . .	569	52	114	74
80	154	77	766	Salford . .	706	82	142	91
82	187	66	728	Chorlton . .	646	53	148	96
64	172	74	731	West Derby .	632	62	144	70
65	112	72	839	Sheffield . .	670	79	111	92
54	73	89	740	Leicester . .	659	81	66	63
43	113	53	661	Merthyr Tydfil .	654	62	131	57
28	115	42	661	Coventry . .	573	42	120	34
74	84	55	691	Newcastle-on-Tyne.	594	49	70	91
38	92	44	562	Gateshead . .	516	43	89	44
37	63	48	645	Derby . .	639	42	46	33
52	76	39	560	Penzance . .	456	43	66	53
10	46	27	578	Kidderminster .	544	19	41	12
46	118	83	550	Huddersfield .	550	83	114	46
21	71	36	516	King's Norton .	465	33	62	25
38	96	35	507	Tynemouth .	506	29	99	43
42	92	20	491	Liskeard . .	432	20	93	56
21	20	18	465	Knaresborough .	451	23	31	32
35	43	42	457	Wycombe . .	535	31	44	41
33	132	17	451	Ulverstone .	430	11	151	44
35	87	58	438	Sculcoates . .	418	47	84	45
49	32	22	419	Bedford . .	527	20	30	66

is high in East Stonehouse, Stoke Damerel, Plymouth, Salford, Chorlton, West Derby, and other places where the mortality from pulmonary affections is high ; but it is also higher in Huddersfield than in Merthyr or Coventry ; higher in Sculcoates than in Ulverstone, Knaresborough, Liskeard, or King's Norton ; although the death-rate from pulmonary affections is higher in Merthyr and Coventry than in Huddersfield; higher in King's Norton, Liskeard, Knaresborough, and Ulverstone than in Sculcoates.

Epidemics of measles and hooping-cough.

Measles and hooping-cough being contagious diseases, it may be supposed of these, as of small-pox, that the death-rates are largely influenced by the prevalence or absence of epidemic visitations during the seven years for which the average rate of mortality has been calculated. This supposition is partially true in some of the smaller districts, inasmuch as the mortality in them is sometimes so small that the addition or subtraction of a very few deaths would sensibly influence the death-rate ; but it does not apply to larger places. Even in the smallest places, however, these diseases have appeared oftener than once during the seven years. Thus measles produced deaths in four of the seven years in New Forest; in six years in Knaresborough; in two years in Haltwhistle; and in four years in Glendale; and hooping-cough was more or less fatal in four of the seven years in New Forest; in six years in Knaresborough; in five years in Haltwhistle; and in five years in Glendale. Even in places where these diseases have produced an appreciable amount of mortality in each of the seven years they seem to have appeared at intervals in an epidemic character, and this more frequently twice or thrice than once only during the septennial period. Sometimes an epidemic has occupied part of two years, as in Wolverhampton and Worcester, where there were epidemic visitations of measles in 1850 and 1851; and in Chorlton, Huddersfield, Leicester, and Birmingham, which were visited by epidemics of measles that appeared to have produced a considerable mortality both in 1848 and 1849. The mortality from hooping-cough has fluctuated less than that from measles, but it also has usually been more fatal in certain years.

Years and places in which measles and hooping-cough prevailed epidemically.

Although of course places in vicinage to each other have frequently suffered from hooping-cough and measles at or near the same time, these diseases have shown no decided general partiality for particular years. Measles was epidemic in Chorlton, Leicester, and Birmingham in 1848, 1849, and 1850; in Kidderminster, Worcester, Wolverhampton, Derby, Easington, Houghton-le-Spring and Coventry in 1851; in Merthyr Tydfil, Chorlton, Salford, Manchester, West Derby, and other places in 1852; in Birmingham, Macclesfield, Penzance, Redruth, Merthyr Tydfil, Salford, and Manchester in 1853; in Derby, Gateshead, Leicester, King's Norton, Newcastle-on-Tyne, Leeds, and Coventry in 1854. So likewise hooping-cough prevailed in Chorlton, Salford, Easington, Newcastle-on-Tyne, Macclesfield, Liskeard, and Redruth in 1848 and 1849; in Merthyr Tydfil, Gateshead, Leicester, Plymouth, and Sheffield in 1850; in Chorlton, Salford, Manchester, Birmingham, Newcastle-on-Tyne, and Liverpool in 1851, 1852, 1853, and 1854. In most of these places there were several distinct periods in which the mortality from meazles or hooping-cough considerably exceeded the average. In all of them some deaths are recorded in each of the seven years.

Absence of relation between the mortality from measles and hooping-cough and from "strumous affections."

Supposing that measles and hooping-cough might perhaps be most fatal in strumous subjects, I have compared the mortality from scrofula and tabes mesenterica with the mortality from measles and hooping-cough, but find there is no relation whatever between the mortality produced by these forms of strumous disease and that caused by the two contagious diseases. This result is not surprising, since evidently it is the pulmonary form of strumous disease that would constitute a predisposition for the fatal pulmonary complications of measles and hooping-cough.

(c) *Scarlatina.*

Comments on the death-rates from scarlatina.

(c) *Scarlatina* resembles measles and hooping-cough in respect of its contagiousness, and is more easily propagated than either from the great tendency of its contagion to cling to formites, but differs entirely from them in its complications and sequelæ. The proportion of deaths occasioned by scarlatina varies less in different *in Tables* LVI., LVII., *and* LVIII.

places than that produced by measles and hooping-cough. It is most fatal in the densely peopled North-western counties, in London, and in Yorkshire. The scarlatinal death-rate of each of these divisions exceeds that of the other divisions falls below, the scarlatinal death-rate of England and Wales. The proportion of deaths produced by scarlatina is highest in the counties of Lancashire, Cheshire, Staffordshire, North Wales, the West Riding of Yorkshire, and Durham; lowest in Buckinghamshire, Hertfordshire, Bedfordshire, and Herefordshire. The scarlatinal death-rates of Lancashire and Cheshire are more than three times as high as the corresponding death-rates of Herefordshire and Bedfordshire; but the scarlatinal death-rates of Northamptonshire, Gloucestershire, and Lincolnshire, in which the mortality occasioned by measles and hooping-cough is low, are comparatively high.

Comparative mortality of the sexes.

The female exceeds the male death-rate from hooping-cough in all the great registration divisions, in the counties, and, with few exceptions, in the districts also; but scarlatina is usually more fatal to males than to females. The male death-rate from scarlatina is higher than the female in all the registration divisions excepting Yorkshire, where the female slightly exceeds the male death-rate. In seventeen of the twenty-three counties in the table (page 86) the male is higher than the female death-rate; it is about equal to the female death-rate in Staffordshire, Worcestershire, Lincolnshire, Nottinghamshire, and the West Riding of Yorkshire, and is below the female death-rate in Herefordshire and Monmouthshire. The male death-rate from scarlatina exceeds the female death-rate in most of the large registration districts, as in Liverpool and West Derby, in Bristol, Birmingham, Manchester, Chorlton and Salford, Leeds, Plymouth and Devonport, Newcastle-on-Tyne, Gateshead and Huddersfield. In Hull, Wolstanton, Liskeard, and Wycombe the male and female death-rates are about equal. In a few places, as Merthyr Tydfil, Ulverstone, Tynemouth and Knaresborough, the female are greater than the male death-rates.

Absence of uniform proportion between the deaths from scarlatina and from all causes.

The absence of *definite* relation between the proportion of deaths produced by scarlatina and the general death-rates is even more striking than has already been observed to prevail in regard to measles and hooping-cough. The average annual proportion of deaths produced by scarlatina in Glendale, the healthiest district in England,—allowance being made for the fact that the addition or subtraction of a very few deaths makes a sensible difference in the death-rate of so small a community,—is about the same as occurs in Liverpool, the unhealthiest city in the kingdom. Scarlatina was present in both places in each of the seven years, it cannot therefore be supposed that the accordance in the death-rates is due to the existence of an epidemic visitation during some part of the period in the healthy rural district, or the comparative absence of the disease during the same period in the unhealthy city. The children of Leeds and Hull die at very nearly double the rate of the children of Carnarvon, and the general death-rates of Leeds and Hull for persons of all ages are to the general death-rate of Carnarvon as 30 and 31 to 20, yet the average annual death-rate of Carnarvon from scarlatina is higher than the annual average death-rates of Hull and Leeds. Where eight persons would die in Tynemouth from all causes, nine die in the neighbouring town of Newcastle, but where seven die in Newcastle from scarlatina, eight die in the otherwise healthier district of Tynemouth. The general death-rate of Merthyr Tydfil only slightly exceeds the general death-rate of Leicester; but the scarlatina death-rate of Merthyr Tydfil exceeds the scarlatina death-rate of Leicester by more than 50 per cent. Manchester, Chorlton, and Salford form one great city, just as do London, Westminster, and Marylebone, and their death-rates from all causes differ much as do the death-rates of different portions of the metropolis. The average annual proportion of deaths from all causes in Manchester is 33 in each 1,000 persons of all ages and both sexes; that of Salford is 28; and that of Chorlton 25; but the average annual proportion of deaths from scarlatina is considerably higher in Chorlton than in either of the adjoining districts, notwithstanding that it is at once the healthiest and the least densely populated district of the three. Manchester, which is the unhealthiest of the three districts in respect of the general mortality, sustains the smallest proportionate mortality from scarlatina. It must be remembered that these are not small districts in which the occurrence of a few deaths more or less annually would produce any sensible influence on the death-rates. The population of Manchester is not far short of a quarter of a million (228,443 in 1851), that of Salford was 87,523 in 1851, and that of Chorlton 123,841.

Epidemics of scarlatina.

Scarlatina was fatal to some persons annually in most of the districts, and particularly in the more populous towns and denser districts where the closer aggregation of the people is favourable to the extension of contagious diseases. There were, however, marked periods of epidemic outbreak in most of the districts, and these appear sometimes to have occurred simultaneously in several parts of the country. Thus, in 1848, there was a considerable mortality from scarlatina in Wolverhampton, Dudley, Chorlton, Salford, Manchester, Huddersfield, Houghton-le-Spring, King's Norton, Birmingham, Macclesfield, Liverpool, Leeds, Sheffield, and Coventry; and again in 1854, in Wolverhampton, Dudley, Kidderminster, Worcester, Merthyr Tydfil, Chorlton, Salford, Manchester, Huddersfield, Derby, Gateshead, Easington, King's Norton, Birmingham, Ulverstone, Liverpool, Bradford, Sheffield, Plymouth, Devonport, Penzance, Redruth, and Coventry. It has rarely happened that a considerable proportion of the mortality has occurred in a single year; Norwich, where, out of a total mortality of 663 during the entire septennial period, 551 deaths occurred in 1850, being rather an exceptional case.

C. ALVINE FLUX.

Influence of local causes on the death-rates.

C. ALVINE FLUX. Under this term are comprised the three diseases, diarrhœa, dysentery, and cholera. No fact in sanitary science seems better established than that diarrhœa and cholera are intimately associated with local causes of insalubrity; that, as has been said, "filth is either their parent or their nurse." So many independent observers in this and other countries have separately arrived at the conclusion that the prevalence and fatality of cholera are in some way connected with the infection of the atmosphere, or the fouling of the water habitually used for dietetic purposes, with the products of decomposed human excrement, that there seems good reason for the supposition that this form of filth has an important influence either in the production or the aggravation of cholera. There is indeed no sufficient reason to believe that this description of impurity in its undecomposed state is capable of causing cholera or diarrhœa; neither has any satisfactory evidence been adduced that any kind of human excretion is capable of producing cholera directly, as small-pox, scarlatina, or gonorrhœa are caused by their respective special poisons; but that some product of the decomposition of excrement is, either directly or indirectly, causative of cholera, seems now to be all but established. Probably dysentery is likewise largely influenced by adventitious circumstances, especially by diet; and whilst no competent observer hesitates to believe that dysentery is often of sporadic origin, it seems probable, as was asserted by Sir John Pringle a century since, that the odour of dysenteric stools is capable of exciting dysentery.

Great differences of death-rate from alvine flux.

There are very wide differences of death-rate from the class of diseases now under consideration. The largest proportion of deaths occurs among the females of Liverpool, to whom the three diseases here called alvine flux were on the average annually fatal to 685 persons per 100,000 during each year of the six comprised in the present investigation.* The lowest death-rate occurs in Aberystwith, where only an inappreciable portion, represented by 4 per 100,000 of the population, annually, perished during the seven years 1848–54. Bootle, Builth, and Holsworthy are other districts in which the mortality from this class of diseases was likewise almost inappreciable, and there are several other places in which it was exceedingly small. Considering that no means exist for excluding simple infantile diarrhœa from the calculation, the statistics here furnished show how largely this class of diseases is produced by accidental circumstances.

Death-rates in the Divisions and Counties.

The average annual death-rate from the three diseases in England and Wales during the seven years 1848-54 was, 170 per 100,000 males of all ages, 160 per 100,000 females. This rate was exceeded in four of the great divisions of the country, namely, in London, the North-western counties, Yorkshire, and the Northern counties. Diarrhœa was more fatal in the North-Western counties, London, the West Midland counties, and Yorkshire, than in the whole of England and Wales. Cholera was most fatal in London, in the Northern counties, and in Monmouthshire and Wales. Dysentery was most fatal in the North-western counties and in Yorkshire. The North Midland and South-western counties are the divisions in which this group of diseases was least fatal ; but although the South-western counties were thus salubrious in respect of the mortality from the entire class of profluvial diseases, cholera was more fatal there than in either the South Midland or the Eastern counties ; a circumstance caused by the large mortality in some parts of the South-western division at epidemic periods. Hereford-

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* A fraud having been discovered in the returns from one of the Liverpool sub-registration districts for 1848, that year is excluded from the calculation, which thus comprises only six years in the case of Liverpool.

TABLE LIX. *Male and female death-rates from* ALVINE FLUX *in the Divisions and Counties.*

AVERAGE ANNUAL PROPORTION of DEATHS from ALVINE FLUX during the Septennial Period 1848–54 in the Divisions and under-mentioned Counties of England and Wales.

Male per 100,000.				Name of District.	Female per 100,000.			
Dysentery.	Cholera.	Diarrhœa.	Alvine Flux.		Alvine Flux.	Diarrhœa.	Cholera.	Dysentery.
14	67	89	170	ENGLAND AND WALES.	160	81	66	13
11	166	117	294	London . .	268	100	160	8
10	48	71	129	South-eastern Counties.	117	66	44	7
6	39	74	119	South Midland Counties.	110	67	37	6
5	29	70	104	Eastern Counties.	88	60	24	4
8	43	46	97	South-western Counties.	89	41	40	8
12	45	108	165	West Midland Counties.	150	97	42	11
8	15	66	89	North Midland Counties.	82	61	13	8
30	67	149	246	North-western Counties.	233	136	70	27
26	64	93	183	Yorkshire .	179	89	62	28
10	100	71	181	Northern Counties.	183	68	107	8
8	71	38	117	Monmouthshire and Wales.	107	35	65	7
6	42	62	110	Hertfordshire .	98	57	36	5
7	36	76	119	Buckinghamshire	106	68	31	7
6	22	61	89	Northamptonshire.	80	51	23	6
7	21	85	113	Bedfordshire .	107	78	24	5
4	52	82	138	Cambridgeshire	121	66	51	4
15	38	38	91	Cornwall . .	86	32	38	16
8	63	89	160	Gloucestershire	137	71	60	6
4	2	28	34	Herefordshire .	29	24	2	3
10	75	128	213	Staffordshire .	205	124	72	9
8	32	76	116	Worcestershire	104	66	31	7
26	18	169	213	Warwickshire .	188	151	14	23
11	8	90	109	Leicestershire .	90	80	4	6
5	23	54	82	Lincolnshire .	79	51	21	7
12	16	82	110	Nottinghamshire	100	74	17	9
28	35	101	164	Cheshire . .	147	91	28	28
30	73	159	262	Lancashire .	251	145	79	27
28	57	98	183	West Riding .	179	94	55	30
13	105	84	202	Durham . .	208	83	110	15
8	150	71	229	Northumberland	237	66	163	8
8	38	57	103	Cumberland .	109	53	45	11
17	77	54	148	Monmouthshire	121	52	55	14
9	110	43	162	South Wales .	151	40	103	8
3	12	21	36	North Wales .	34	19	11	4

shire, North Wales, Lincolnshire, Northamptonshire, and Cornwall, among the counties here referred to, present the lowest rates of mortality. The death-loss per 100,000 persons in Herefordshire and North Wales is only one fifth that sustained by England and Wales. Cornwall and Northamptonshire sustained nearly three times as large and Lincolnshire more than twice as large a mortality as Herefordshire; and yet, as has just been said, the counties of Lincoln, Northampton, and Cornwall are comparatively healthy. The death-rate of each of the three counties from profluvial diseases was less than half the death-rate of the West Riding of Yorkshire, or of Durham, Warwickshire, Staffordshire, and Northumberland, and, Cornwall excepted, less than one-third the death-rate of Lancashire. Cholera produced a larger proportion of deaths than diarrhœa in London, Durham, Northumberland, Monmouthshire, and South Wales. No doubt this result, as regards London, Northumberland, and Durham, is partly to be attributed to the greater severity in them of the epidemic visitation of 1853–54. Diarrhœa was more fatal to males than females in all the divisions and counties; cholera was more fatal to females than males in Lancashire, Durham, Northumberland, and Cumberland.

A selection of districts in which profluvial diseases were most fatal is contrasted in the annexed table with others in which the fatality was comparatively small. Very small districts from which no certain conclusions can be drawn have been excluded.

TABLE LX.
Male and female death-rates from ALVINE FLUX *in several Registration Districts.*

Male per 100,000.				Name of District.	Female per 100,000.			
Dysentery.	Cholera.	Diarrhœa.	Alvine Flux.		Alvine Flux.	Diarrhœa.	Cholera.	Dysentery.
43	330	267	640	Liverpool	685	269	385	31
59	375	149	583	Hull	535	151	335	49
16	398	109	523	Merthyr Tydfil	548	125	409	14
73	200	216	489	Leeds	497	193	230	74
59	232	192	483	Sculcoates	447	155	233	59
80	93	303	476	Coventry	385	251	78	56
15	270	130	415	Newcastle-on-Tyne.	425	120	293	12
15	207	191	413	Wolverhampton	392	183	193	16
24	272	109	405	Plymouth	389	97	260	32
45	57	288	390	Manchester	340	236	67	37
36	43	284	363	Salford	323	244	52	27
15	225	87	327	Gateshead	362	92	250	20
8	229	82	319	Tynemouth	335	81	247	7
13	160	136	309	Bristol	258	112	140	6
54	36	217	307	Chorlton	272	190	41	41
28	10	253	291	Birmingham	261	225	6	30
33	44	194	271	Sheffield	268	189	37	42
23	18	206	247	Nottingham	174	149	14	11
20	6	213	239	Leicester	182	166	4	12
11	132	79	222	Abergavenny	178	85	87	6
21	71	67	159	Wycombe	122	58	59	5
10	38	110	148	Berkhampstead	123	103	20	0
11	18	114	143	Blackburn	128	100	15	13
7	18	95	120	Derby	106	87	11	8
3	59	45	107	Liskeard	97	39	58	0
14	25	66	105	Northampton	99	62	26	11
16	18	67	101	Huddersfield	92	62	11	19
12	22	59	93	Basford	93	61	27	5
6	17	69	92	Bedford	100	73	22	5
11	4	71	86	Kidderminster	90	73	7	10
25	12	41	78	Halifax	74	41	7	26
8	23	31	62	Glendale	50	27	19	4
6	4	43	53	Ulverstone	63	55	3	5
2	2	45	49	Belper	54	41	7	6
0	0	4	4	Aberystwith	5	3	1	1

Comments on Table LX.

Cholera.

The highest mortality is presented by two of the chief sea port towns, Liverpool and Hull. Merthyr Tydfil, Leeds, Coventry, and Wolverhampton are the inland towns which come nearest to these sea ports in the mortality they have sustained from profluvial diseases. Cholera has generally been fatal where diarrhœa also is fatal; but in some cases, as Gateshead, Tynemouth, and Abergavenny, although the diarrhœal death-rate is comparatively low, the mortality from cholera has been large. There are, on the other hand, certain districts, as Birmingham, Nottingham, and Leicester, where the mortality from diarrhœa has been very considerable; that from cholera exceedingly small. Birmingham, for example, loses a larger proportion of its inhabitants from diarrhœa than Hull, Merthyr Tydfil, Leeds, Newcastle-on-Tyne, or Wolverhampton, notwithstanding that it has sustained so small a mortality from cholera. Birmingham, in fact, stands fifth on the list of places in the table for insalubrity as regards diarrhœa. The high death-rate of Coventry, both from diarrhœa and cholera, is remarkable, especially when compared with the smaller death-rates of Birmingham, Manchester, Sheffield, and Nottingham.

Diarrhœa.

Large mortality from diarrhœa in Birmingham.

Uncertain proportion of general mortality produced by diarrhœa.

If cholera, which is chiefly fatal at epidemic periods, be excluded from the comparison, there is as remarkable an absence of *definite* relation between the general death-rate and the death-rate from diarrhœa in different places as has been so often observed in respect of the diseases that have already been considered. The general death-rate of Birmingham is rather below the general death-rates of Merthyr Tydfil, Wolverhampton, and Sheffield, and is about the same as the general death-rate of Nottingham, but the diarrhœal death-rate of Birmingham very considerably exceeds the diarrhœal death-rate of each of these towns. So likewise Coventry sustains a larger proportionate mortality from diarrhœa than any of the other districts in the table, yet its general death-rate is lower than the general death-rates of Liverpool, Manchester, Hull, and Leeds. Containing less than one-sixth of the population of Manchester, and having little more than one-third the population density, Coventry, nevertheless, sustained during the septennial period an average annual death-rate from profluvial diseases one-fifth higher than Manchester.

Belper, Halifax, and Chesterfield, when compared with Berkhampstead, afford further illustrations of the same kind. The general death-rates of Chesterfield and Belper are 21, those of Halifax and Berkhampstead are 22 per 1,000 persons of all ages and both sexes, but the average proportion of deaths from diseases of the alvine flux character in each of the seven years was twice as high in Berkhampstead as in Halifax, and three times as high as in either Chesterfield or Belper. The comparison in the latter examples is the more satisfactory because cholera in the epidemic form was not prevalent in any of these districts during the septennial period.

Epidemics of cholera.

Cholera was of course most fatal at the epidemic periods of 1849 and 1853–54. In a few districts, as London, Newcastle-on-Tyne, and Gateshead, it prevailed severely at both periods.

In several districts it prevailed at both periods, but was much less fatal at the latter than the former visitation. Plymouth, Bradford, and Wolverhampton are examples of this fact. A few districts in which it had been severe at the former visitation entirely escaped at the latter period. This was remarkably the case with Tynemouth, which escaped during the fearful visitation sustained by Newcastle-on-Tyne and Gateshead in the autumn of 1853. On the other hand, there are several districts in which no epidemic visitation of cholera occurred, but in which a few deaths from cholera are recorded in each of the seven years. Although cholera was most fatal in the years of epidemic visitation it seems never to have been absent from the country, for cases are annually registered in most of the more populous places. Thus a few deaths from cholera were annually recorded in the mortuary registers of Gateshead, Merthyr Tydfil, Derby, Wolverhampton, Blackburn, Preston, Rochdale, Huddersfield, Halifax, Leicester, and Bradford, and cholera, in no essential respect distinguishable from epidemic cholera, annually proves fatal to some of the inhabitants of London. Deaths from cholera were recorded in Nottingham and Radford in each of the years 1849, 1851, 1852, and 1854.

Cholera never altogether absent.

Cholera appears to have assumed almost an epidemic character in 1852. The deaths in Manchester in that year were equal in number to the deaths in the epidemic year of 1854; and in Blackburn 1852 was next to 1849, the most fatal year of the series. The visitation showed itself in most places rather in the form of diarrhœa than of cholera, and was manifestly epidemic in this milder form in many places. In Derby, Blackburn, Manchester, Rochdale, Chorlton, Salford, Knaresborough, Leeds, Wigan, Ulverstone, Penzance, Redruth, and Sculcoates 1852 was a fatal year for diarrhœa. In most of these places the mortality occasioned by it in 1852 exceeded that of either 1853 or 1854. In Derby, Manchester, Leeds, Wigan, Ulverstone, Penzance, and Redruth, the number of deaths from diarrhœa in 1852 was larger than in any other year of the septennial term. In Preston and Ecclesall Bierlow the deaths from diarrhœa in 1852 were equal to those in 1854. In other places, as Huddersfield, Halifax, Bradford, West Derby, Macclesfield, Liverpool, Norwich, Bedford, and Luton, there was an increased mortality from diarrhœa both in 1852 and in 1854. In Birmingham, Leicester, and Newcastle-on-Tyne, 1851 was a fatal year for diarrhœa.

Epidemic of alvine flux in 1852.

Places of prevalence.

Dysentery, like diarrhœa, produced an appreciable mortality in most of the larger districts in each year, but it also manifested a preference for particular years. Thus it was more fatal in 1852 in Birmingham, Bradford, Leeds, Ecclesall Bierlow, and Preston, than in any other of the seven years. In Macclesfield and Penzance it was most fatal in 1851; in Sculcoates and Halifax in 1851 and 1852. Probably it would be found on further investigation that both dysentery and diarrhœa were much more extensively fatal throughout the country in 1852 than even appears from the examples here cited.

Dysentery.

D. Typhus and Erysipelas.

D. Typhus and Erysipelas.—Fever and erysipelas are frequently mentioned as amongst the most preventable diseases. It would be improper to enter here into an investigation of the evidence that has been adduced in support of the assertion.* Under the common denomination of typhus are comprised several distinct varieties, or, as they are now believed, by many physicians of high authority on the subject, distinct kinds of fever. So also two essentially distinct forms of disease are probably included under the term erysipelas; the one a definite febrile disease, allied to the eruptive fevers, which perhaps arises quite irrespective of removable causes, and like fever and the exanthematous diseases, is very often indeed produced by contagion; the other an unhealthy form of cutaneous and sub-cutaneous inflammation, which certainly occurs most frequently in the over-crowded wards of hospitals, and in persons whose systems have been debilitated and disordered by living amidst filth and other causes of atmospheric contamination. The latter form of erysipelas, or as it would more properly be called erysipelatous inflammation, usually occurs in patients who have sustained some local injury involving a wound of the skin, and, besides arising spontaneously under the conditions already mentioned, it is, like true erysipelas, capable of being propagated by contagion. It is impossible to separate these several forms of fever and erysipelas from each other in an investigation of the present kind; but it is at least very clear, from the figures in the annexed tables, that the high mortality of unhealthy places is only in a small degree attributable to fever, which, moreover, is also frequently the cause of a considerable mortality in places where the general death-rate is low.

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* The causation of fever still requires much investigation. No one practically acquainted with the subject can hesitate to believe that fever is largely preventable. It is true that fever sometimes appears to result from causes that are but little under control, but it is equally true that certain removable causes, if they do not actually produce fever, at least foster its development. I believe local circumstances have much to do with the type of fever, and that the milder fevers of the present day are the representatives of the pestilential fevers of former times, softened in character by the improved state of the population. The diminished mortality from fever in the present as compared with former centuries, shown in the subjoined table, affords the greatest encouragement for the employment of measures calculated, on the one hand, to prevent fever spreading by contagion, and, on the other, to mitigate its intensity if not absolutely to prevent its occurrence.

Average Annual Number of Deaths from Fever in each 10,000 of the inhabitants of London calculated for periods of ten years each, in the 17th, 18th, and 19th centuries. *a*

In each Year of the Decennial Period 1681–90.	In each Year of the Decennial Period 1746–55.	In each Year of the Decennial Period 1846–55.
63·3	53·9	38·5

a The calculation for the present century includes scarlet fever, remitting fever, infantile fever, typhus, cephalitis, and pneumonia, on the supposition that these diseases would all be classed as fevers by the persons who formerly returned the causes of death. A full account of the grounds upon which the selection was made, and of the general basis of the calculations, is contained in "Papers relating to the History and Practice of Vaccination," by Mr. Simon, Medical Officer of the General Board of Health. Appendix H. pp. 26-30.

TABLE LX
Male and female deat rates from TYPHUS *an* ERYSIPELA *in the Divis and Countie*

Population in 1851.	Persons per Square Mile.	Urban Percentage of Population.	Name of District.	Death-rates.			
				Typhus.		Erysipelas.	
				Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
17,927,609	307	50	ENGLAND AND WALES .	100	99	12	12
2,362,236	19,375	100	London	113	98	19	16
1,628,386	256	44	South Eastern Counties .	98	100	12	12
1,234,332	247	28	South Midland Counties .	110	124	13	12
1,113,982	222	31	Eastern Counties . .	100	98	11	10
1,803,291	231	36	South Western Counties .	89	95	10	9
2,132,930	355	51	West Midland Counties .	97	102	12	12
1,214,538	220	30	North Midland Counties .	84	91	11	12
2,490,827	792	63	North Western Counties .	110	106	13	12
1,789,047	313	45	Yorkshire	92	89	11	12
969,126	178	44	Northern Counties . .	77	77	11	11
1,188,914	146	29	Monmouthshire and Wales	115	107	6	5
173,962	260	24	Hertfordshire . . .	102	112	12	9
143,655	228	37	Buckinghamshire . .	110	129	15	12
213,844	216	28	Northamptonshire . .	106	131	13	11
129,805	272	30	Bedfordshire . . .	122	153	13	17
191,894	215	31	Cambridgeshire . . .	118	119	12	10
356,641	259	22	Cornwall	69	71	7	7
419,514	375	55	Gloucestershire . . .	86	91	11	11
99,120	149	25	Herefordshire . . .	59	55	9	6
630,545	534	55	Staffordshire . . .	113	116	12	12
258,733	381	32	Worcestershire . . .	83	92	11	10
480,120	501	65	Warwickshire . . .	112	120	15	15
234,957	283	39	Leicestershire . . .	89	113	11	14
400,236	147	26	Lincolnshire . . .	77	80	12	10
294,380	314	32	Nottinghamshire . .	90	98	10	12
423,526	391	48	Cheshire	84	84	11	10
2,067,301	1,003	66	Lancashire	116	110	13	13
1,340,051	508	46	West Riding . . .	92	93	10	12
411,679	349	42	Durham	84	87	9	9
303,568	154	49	Northumberland . .	83	76	14	13
195,492	125	43	Cumberland . . .	60	65	14	12
177,130	262	28	Monmouthshire . . .	143	142	9	8
607,456	138	34	South Wales . . .	123	112	6	5
404,328	131	22	North Wales . . .	89	87	5	5

(a) *Typhus. Comments o Table* LXI.

(a) *Typhus.*—In round terms, fever was fatal on the average to 100 persons in each 100,000 of the population of England and Wales in each year of the septennial period. This average was exceeded in London, the South Midland counties, the North Western counties, and in Monmouthshire and Wales. The South Eastern counties, the West Midland counties, and the Eastern counties sustained an annual average mortality during the seven years about equal to that of England and Wales. The fever death-rate in the four remaining great registration divisions fell below the general average. The population, the average proportion of persons to a square mile, and the proportion of persons in each hundred of the population that reside in towns, are in the above table shown side by side with the proportion of deaths per 100,000 persons of each sex from fever and erysipelas.

The general death-rates of the South Midland counties and of Monmouthshire and Wales are considerably lower than the general death-rates of London and the North Western counties; the proportion of urban residents in the former is less than in the latter, and the inhabitants are much less densely aggregated on the surface of the soil in the former than in the latter; yet the mortality from fever is larger in proportion to the population in the South Midland counties and in Monmouthshire and Wales than in either London or the North Western counties. So also Bedfordshire, which is chiefly an agricultural county, has a higher mortality from fever in proportion to its population than Lancashire or the West Riding, which contain some of the chief manufacturing towns, and where both the urban per-centage and the density of the population are very much greater than in Bedfordshire. The lowest fever death-rate among the counties is that of Herefordshire, which has already been shown in this paper to enjoy a singular salubrity in regard to contagious diseases. How far this salubrity depends upon the absence of facilities for the propagation of fever and analogous diseases by contagion I am unable to say, but the general death-rate of Herefordshire is rather higher than the general death-rates of Lincolnshire and Hertfordshire, which in proportion to their respective populations, sustain a larger amount of mortality from contagious diseases and fever than Herefordshire.

Differences of male and female mortality from fever.

The differences of fever death-rate in males and females are very considerable and very irregular. In some divisions and counties the male mortality from fever is proportionably much higher than the female; in others the female is much higher than the male. In England and Wales the rates are nearly equal, the male only slightly exceeding the female fever death-rate. In one of the two most fatal divisions, the South Midland counties, the female exceeds the male death-rate from fever in the proportion of 112 to 100; in Monmouthshire and Wales, the next most fatal division, the male exceeds the female death-rate from fever in the proportion of 100 to 93. Differences still greater exist in the death-rates of the sexes in the counties. On examining the table no definite rule can be deduced from the facts it contains; but Cambridgeshire and Lincolnshire, where the male and female death-rates are about equal, are inhabited by an agricultural population; Cheshire and the West Riding, where the male and female death-rates are likewise equal, have a considerable proportion of their female and a still larger proportion of their male inhabitants employed in manufactures; and Bedfordshire and Buckinghamshire, in which the female death loss from fever is proportionably highest, and most largely exceeds the male death-loss, are counties in which the proportion of females engaged in manufactures is very much greater than that of males. In Northamptonshire, also, where 12·6 per cent. of the men are

TABLE LXII. *Male and female death-rates from* TYPHUS, *with the proportion of men and women engaged in manufactures.*

Per-centage of adult Males engaged in Manufactures.	Deaths from Typhus per 100,000 Males.	Name of County.	Deaths from Typhus per 100,000 Females.	Per-centage of adult Women engaged in Manufactures.
5·7	122	Bedford	153	33·2
12·6*	106	Northampton	131	13·8†
6·4	110	Buckingham	129	22·2
44·4	92	West Riding	93	14·8
28·4	84	Cheshire	84	14·1

* Exclusively shoemakers. † Chiefly lace and straw plait.

shoemakers, and 42·1 per cent. are employed in agriculture, but nearly 14 per cent. of the women are employed in the manufacture of lace and straw plait, the female very considerably exceeds the male death-rate from fever.

The highest mortality from fever in proportion to its population occurs in Abergavenny, where the average annual fever death-rate is upwards of 200 per 100,000 persons. Excluding places of small population, where a very few deaths more or less would materially influence the result, one of the lowest occurs in Penzance, where the average annual mortality from fever is at the rate of about 65 per 100,000 persons. Abergavenny and Merthyr Tydfil in Wales, and Leighton Buzzard in Bedfordshire,

TABLE L XIII. *Death-rates from* FEVER *and* ERYSIPELAS *in Registration Districts.*

Population in 1851.	Persons per Square Mile.	Name of District.	Death-rates.			
			Typhus.		Erysipelas.	
			Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
59,229	430	Abergavenny	217	201	9	7
76,804	435	Merthyr Tydfil	211	202	6	3
17,142	289	Leighton Buzzard	189	217	9	20
90,738	1,333	Blackburn	169	160	10	9
104,158	1,237	Wolverhampton	158	145	9	11
258,236	74,446	Liverpool	157	138	22	18
228,433	11,577	Manchester	149	141	14	12
101,343	30,886	Leeds	144	120	10	11
25,087	393	Luton	132	152	10	20
12,806	194	Towcester	131	161	9	15
33,857	1,037	Northampton	130	155	12	14
13,069	208	Cranbrook	126	104	9	7
12,527	326	Berkhampstead	126	105	14	7
173,951	41,853	Birmingham	126	131	18	16
7,579	72	Pateley Bridge	122	92	4	19
13,120	330	Hemel Hempstead	115	145	16	13
20,716	212	Saffron Walden	113	121	4	1
58,419	19,994	Nottingham	110	111	14	12
35,523	234	Bedford	106	127	12	11
96,545	908	Preston	102	103	7	8
63,327	497	Macclesfield	101	102	10	9
87,525	11,597	Salford	99	83	13	10
43,684	9,413	Derby	98	97	19	16
181,964	2,887	Bradford	92	94	8	11
123,841	6,863	Chorlton	90	80	12	13
11,574	168	Blofield	89	99	10	12
68,195	10,091	Norwich	89	91	16	17
64,248	1,035	Tynemouth	87	77	9	10
123,860	1,191	Huddersfield	80	89	12	10
30,871	696	King's Norton	76	77	15	11
53,628	852	Redruth	74	75	4	5
14,567	103	Weardale	72	81	13	4
27,677	2,644	Worcester	72	73	31	13
120,958	1,495	Halifax	67	80	6	8
30,556	145	Ulverstone	65	83	10	10
53,517	526	Penzance	62	69	10	8

Comments on Table LXII.

each sustain double the average annual mortality of the entire country from fever in proportion to the number of their inhabitants. Redruth, Worcester, Halifax, and Penzance each sustain a much lower rate of death from fever than England and Wales. Assuming the fever death-rate of England and Wales to be 100, the death-rate of Abergavenny would be 209; of Merthyr Tydfil 206; of Leighton Buzzard 203; of Redruth 74; of Worcester 72; of Halifax 73; of Penzance 65. The mortality from fever in the large and densely peopled cities of Manchester and Liverpool is rather less in proportion to their population than the mortality in the much less thickly peopled towns of Blackburn and Wolverhampton; lower in Blackburn and Wolverhampton than in the smaller and much less dense population of Leighton Buzzard, Merthyr Tydfil, and Abergavenny. The mortality from fever in Luton, Towcester, and Northampton is greater in proportion to the number of their inhabitants than occurs in Birmingham. The thinly peopled districts of Pateley Bridge and Saffron Walden sustain a higher proportionate mortality from fever than the towns of Salford, Derby, Bradford, and Norwich. The healthy district of Glendale, where the inhabitants are sparsely distributed over the face of the country at the rate of 65 persons to a square mile, sustains as large an average death-rate from fever as the towns of Halifax and Penzance, which have respectively 1,495 and 526 persons resident on each square mile. The general death-rate of Glendale is 15 in the 1,000; that of Penzance 20, and of Halifax 22 in each 1,000 inhabitants annually. The circumstance does not appear to arise from any accidental cause, as the importation of fever into Glendale, and a large consequent mortality at one period, for the deaths are distributed with tolerable evenness over the seven years.

Comparative mortality of males and females from typhus.

In some of the districts the male, in others the female death-rate from fever is highest. In Nottingham, Preston, Macclesfield, Derby, Norwich, King's Norton, Redruth, and Worcester, the sexes die in about equal proportions, whence it may be inferred that they are equally exposed to the influence of contagion or to the other causes of fever. The male death-rate considerably exceeds the female in Abergavenny, Merthyr Tydfil, Blackburn, Wolverhampton, Liverpool, Manchester, Leeds, Salford, Chorlton, and Tynemouth. These are all places in which the general death-rates are high; Tynemouth, the healthiest of the series, loses 24 persons annually by death out of each 1,000 of its population, and several of the others are among the unhealthiest districts in England. The greatest excess of the female over the male death-rate occurs in Halifax, Ulverstone, Hemel Hempstead, Towcester, Bedford, Northampton, Leighton Buzzard, and Luton. In Halifax and Northampton the male and female population are both employed in manufactures, but the male very much more largely than the female. In Ulverstone a proportion of the adult women, scarcely exceeding 2 per cent., are employed in the cotton manufacture. In the other places the female population is largely employed in special manufactures; the male almost exclusively in agricultural pursuits. On the other hand, the female mortality is higher than the male in Birmingham, Saffron Walden, Huddersfield, and Weardale; and the male is considerably higher than the female in Berkhampstead, where more than 28 per cent. of the women are employed in the manufacture of straw plait.

The comparative mortality of the sexes varies at different periods of life. The death-rate for the whole of life is about

Table LXIV. Male and female death-rates from fever under and above 20 years of age.

AVERAGE ANNUAL PROPORTION of DEATHS produced by Typhus in the several under-mentioned Districts in Persons under and above 20 Years of Age.

Male, per 100,000.		Name of District.	Female, per 100,000.	
Above 20 Years.	Under 20 Years.		Under 20 Years.	Above 20 Years.
92	79	New Forest	106	105
131	130	Towcester	173	150
74	62	Glendale	80	84
57	35	Haltwhistle	35	0
48	36	Easington	61	40
88	120	Houghton-le-Spring	142	31
77	71	Redruth	95	55
40	17	Alston	8	67
25	49	Reeth	68	33
115	43	Carnarvon	84	62
186	117	Liverpool	138	117
89	117	Bristol	163	84
142	148	Hull	106	89
96	161	Birmingham	180	90
128	193	Wolverhampton	164	114
99	88	Wolstanton	99	85
149	148	Manchester	142	141
161	122	Leeds	118	121
117	81	Macclesfield	107	98
74	70	Leek	115	72

equal in males and females in Redruth and Macclesfield, but the proportionate death-rate of adult men in both places is much higher than that of adult women. The female exceeds the male death-rate for the whole of life in Birmingham and Bristol, but the mortality of adult men exceeds that of adult women in both these cities. The male exceeds the female death-rate for the whole of life in Hull, Leeds, and Liverpool, but the adult male still more largely exceeds the adult female mortality in each of these places. The mortality of females above twenty years of age in Towcester exceeds the mortality of males above twenty years of age in nearly the same proportion as the female exceeds the male death-rate for the whole of life. The mortality of women from fever also exceeds the mortality of men in Glendale, New Forest, Alston, and Reeth. It is remarkable that the mortality of females from fever is greater than that of males in each of the three chief lead-mining districts of Alston, Weardale, and Reeth.

Epidemics of fever.

Fever prevailed annually during the septennial period in all the considerable and most of the smaller districts. In some places there does not appear to have been any distinct epidemic visitation during the seven years, but in other places the mortality was considerably larger in particular years. In Gateshead, Blackburn, Penzance, and Merthyr Tydfil, 1852 and 1853 were fatal years. The epidemic appears to have commenced in Merthyr in 1851, and to have attained its climax in 1853. Fever was epidemic in Swansea, Preston, Manchester, and Gravesend in 1848; in Melksham, Newcastle-on-Tyne, Gravesend, and many other places, in 1849; in Huddersfield, Macclesfield, and Hull in 1852; and in Swansea, Birmingham, and some other towns in 1854.

Comparative number of deaths from fever below and above 20 years of age.

It has often been asserted that fever is especially a diease of mature life. This assertion has been based upon insufficient data, for of 10,995 deaths that occurred during the septennial period in twenty of the districts comprised in this investigation, among which are included Liverpool, Manchester, Bristol, Hull, Birmingham, Wolverhampton, and Leeds, 4,700 occurred in persons under twenty years of age, and 6,295 in adult men and women aged twenty years and upwards. The population of the twenty places in 1851 amounted to 1,297,832. The basis of the investigation is therefore surely large enough. The average annual male death-rate per 100,000 persons under twenty years of age was 109; above twenty years of age, 136. The female death-rate per 100,000 persons over the age of twenty years was 114; under twenty years of age, 122. Thus the female fever death-rate is higher than the male in early life; lower than the male in adult life. The male mortality is greater in adults than in persons below twenty; whilst in females, on the contrary, the mortality of children and young persons under twenty years of age is greater than the mortality of adult women. As fever is probably more fatal to persons above than to those below twenty years of age, these death-rates rather encourage the supposition that, however the intensity of fever may differ at the different periods of life, the liability to be attacked by it is not greater in mature than in early life. To prevent misapprehension, it may be well to state that the deaths from remittent and infantile fever are not included under the head of typhus in any of the calculations contained in this paper.

(b) *Erysipelas.*

(b) *Erysipelas.*—The mortality from erysipelas is not large anywhere. London, among the great divisions, sustains the largest, and Monmouthshire and Wales the smallest death-loss. The London death-rate in both sexes is three times as high as the death-rate of Monmouthshire and Wales. The variations of death-rate in the other great registration divisions of the country are insignificant. Buckinghamshire, Bedfordshire, Warwickshire, Northumberland, and Cumberland present the highest death-rates among the counties; Durham, Monmouthshire, Herefordshire, Cornwall, South Wales, and North Wales present the smallest death-rates. The female exceeds the male death-rate from erysipelas in Bedfordshire, Leicestershire, Nottinghamshire, and the West Riding of Yorkshire; the male is higher than the female death-rate in all the other counties. It is not perhaps unworthy of notice that the female death-loss from erysipelas is proportionably higher than the male in Bedfordshire, where the men are chiefly employed in agriculture, but thirty-three per cent. of the women are employed in manufactures, and likewise in Leicestershire and Nottinghamshire, where the women are largely employed in the manufacture of lace.

The male death-rate of Worcester from erysipelas is very high, and is very nearly two-and-a-half times as high as the female death-rate of the same place. Excluding this evidently exceptional case, Liverpool, Derby, Birmingham, Norwich, Hemel Hempstead, Berkhampstead, King's Norton, and Nottingham, present the highest death-rates; Merthyr Tydfil, Redruth, Halifax, Preston, Tynemouth, and Bradford, among places of sufficient size to admit of fair comparison, present the smallest death-rates from erysipelas.

E. CROUP, INFLUENZA, AND AGUE.

E. CROUP, INFLUENZA, AND AGUE. The mortality produced by the three diseases is in no instance large, and it forms only a small proportion of the general death-rate. Under the name of croup are probably registered many deaths caused by spurious or spasmodic croup; a disease often perhaps mistaken for inflammatory croup, but really of a very different nature. Influenza prevails chiefly in the epidemic form; and indeed it is questionable whether the cases annually registered as influenza in several of the larger districts ought to be classed in the same category with epidemic influenza. The relation between ague and malaria is perhaps one of the best established truths in medicine. Although ague only occurs in unhealthy places, town influences are by no means particularly favourable to its development. The covering of the surface of towns with roads and buildings, and the drainage of the subsoil, tend to prevent the extrication of malaria, or to remove its cause. Ague is rarely immediately fatal in this climate.* When death results from malaria in this country it usually arises from some secondary affection, and is not registered under the name of ague. For this reason the death-rates shown in the tables must by no means be received as correct indications of the amount of mortality caused by malarious poisoning. The total mortality from this cause is probably much larger than is usually believed; and yet even so it will in this climate constitute but a very small proportion of the general death-rate.

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* The 13th Triennial Report of the Physician to the Peterborough Public Dispensary and Infirmary, by Dr. Paley, records the treatment of 1,394 cases of ague in that institution during the nine years 1846-54, and 1854, whereof only one was fatal. The same report contains a very carefully prepared table of the epidemic diseases treated in each year since 1816 by the physicians of the institution. It appears from this table that the number of ague cases has largely fluctuated from year to year. The greatest number treated in any single year was in 1827, but there have been several periods of augmentation and decline during the thirty-nine years. Thus the number of cases sprung from 39 in 1819 to 106 in 1820, 92 in 1821, 110 in 1822, and 232 in 1823. In 1824 they fell to 41, but rose in the following year to 120, in 1826 to 254, and in 1827 to 507. They now began to decrease until they amounted to only 62 in 1830 and 49 in 1831. In 1832 the number of cases was 103, but they now again fell, and between 1834 and 1847, the number of cases only once amounted to 60 in the year. The numbers in the three following years were 143 in 1848, 171 in 1849, and 184 in 1850. They again decreased in the years 1851 and 1852, although less than at the previous declension, and rose again in 1853 and 1854, to 208 in the former and 279 in the latter year.

TABLE LXV. *Male and female death-rates from* **CROUP, INFLUENZA,** *and* **AGUE** *in the Divisions and Counties.*

Death-rates, Male, per 100,000.			Name of District.	Death-rates, Female, per 100,000.		
Ague.	Influenza.	Croup.		Croup.	Influenza.	Ague.
1·1	13	24	ENGLAND AND WALES	20	14	0·9
1·2	8	17	London	13	10	0·8
2·0	15	16	South Eastern Counties	13	15	1·2
1·7	19	18	South Midland Counties	15	20	1·6
2·0	13	13	Eastern Counties	12	13	1·8
0·6	19	21	South Western Counties	17	21	0·5
0·5	15	22	West Midland Counties	19	15	0·2
1·1	21	23	North Midland Counties	18	22	1·3
0·9	8	42	North Western Counties	35	8	0·9
0·7	10	27	Yorkshire	23	11	0·6
1·7	12	26	Northern Counties	23	14	1·9
0·4	12	35	Monmouthshire and Wales	32	13	0·5
0·7	11	16	Hertfordshire	14	12	0·7
0·8	25	17	Buckinghamshire	12	27	0·6
1·6	31	21	Northamptonshire	20	29	1·3
0·7	29	16	Bedfordshire	11	25	0·4
3·1	12	19	Cambridgeshire	17	11	3·6
0·5	16	23	Cornwall	21	18	0·2
0·4	19	13	Gloucestershire	9	20	0·1
0·3	19	17	Herefordshire	16	16	0·
0·6	12	31	Staffordshire	29	12	0·2
1·0	16	22	Worcestershire	19	14	0·1
0·5	17	19	Warwickshire	16	17	0·2
0·1	17	24	Leicestershire	18	19	0·
1·8	18	19	Lincolnshire	17	21	2·6
0·6	19	19	Nottinghamshire	14	20	1·0
0·8	12	29	Cheshire	27	11	0·9
0·9	8	45	Lancashire	37	8	0·9
0·8	8	28	West Riding	24	9	0·7
2·2	10	26	Durham	21	12	2·4
1·9	9	26	Northumberland	21	10	2·0
0·6	14	26	Cumberland	26	19	0·6
1·1	12	22	Monmouthshire	17	11	0·8
0·3	10	45	South Wales	42	11	0·5
0·2	15	26	North Wales	23	18	0·3

(a) *Croup.*

(a) *Croup* is usually thought to be more fatal in damp places, by the sides of rivers and marshes, than in drier and more elevated situations. If this supposition were correct, croup might, therefore, be expected to be most fatal where ague is most fatal. The annexed tables, however, show that there is no definite relation between the mortality from croup and that occasioned by ague.

The Eastern counties and South Eastern counties, where ague is most fatal, sustain a smaller mortality from croup than Monmouthshire and Wales, the North Western counties or the West Midland counties, where the mortality from ague is least. Cambridgeshire, Lincolnshire, and Durham, where ague is comparatively fatal, lose a smaller proportion of their inhabitants from croup, than Staffordshire, Cheshire, and Lancashire, where the ague death-rate is low. North Witchford, Spalding, Whittlesey, and Wisbeach, the districts in which the ague death-rate is highest, sustain a smaller proportionate mortality from croup than Aberystwith, Rochdale, Merthyr Tydfil, and Preston, where ague appears to be unknown. The highest mortality from croup occurs in Lancashire and South Wales; but setting aside South Wales, the mortality appears to be larger in the northern than the southern counties of England. While London, for example, only sustains an average annual loss of seventeen males and thirteen females out of each 100,000 of either sex, the death-rate of the four northern counties is twenty-six per 100,000 males and twenty-three per 100,000 females. The death-rate of Yorkshire corresponds very closely with that of the counties on its northern border. The mortality from croup appears large in some of the great towns, but it bears no direct proportion to their general death-rates, and is, perhaps, so large in several of them because cases of spasmodic croup are registered as true croup. With this exception, croup does not seem to be more fatal in towns than in rural districts. Croup is not much more fatal in Macclesfield and Liverpool than in Glendale; it is more fatal in Glendale than in Huddersfield, Wolverhampton, and Bradford; more fatal in Weardale than in Newcastle-on-Tyne, Tynemouth, or Leeds.

Croup more fatal to males than females.

The male are higher than the female death-rates from croup in all the divisions and the several counties in the table, excepting Cumberland, where the male and female death-rates exactly coincide. This accords with medical observation, from which it has been deduced that male are more liable to croup than female children. With few exceptions, the same rule holds good in the districts likewise, Merthyr Tydfil, where the female death-rate is nineteen per 100,000 higher than the male, being the most remarkable exception. Croup has not prevailed in a decidedly epidemic form during any of the years that have been examined.

TABLE LXVI. *Male and female death-rates from* CROUP, INFLUENZA, *and* AGUE *in Registration districts.*

Death-rates, Male, per 100,000.			Name of District.	Death-rates, Female, per 100,000.		
Ague.	Influenza.	Croup.		Croup.	Influenza.	Ague.
0·	23	68	Aberystwith	59	21	0·
0·	6	42	Rochdale	41	2	0·
1·0	4	42	Manchester	30	4	1·0
0·	4	39	Merthyr Tydfil	58	6	0·
0·	9	37	Preston	37	10	1·0
1·0	5	37	Dudley	35	3	0·
1·	5	36	Macclesfield	28	8	1·
2·	2	34	Liverpool	29	2	1·
0·	10	31	Glendale	21	10	0·
2·	8	30	Gateshead	31	3	2·
7·	5	30	North Witchford	25	7	5·
0·	3	28	Huddersfield	28	4	0·
1·	9	28	Wolverhampton	26	9	0·
1·	3	28	Bradford	25	2	1·
0·	70	28	Weardale	22	81	0·
3·	6	25	Newcastle-on-Tyne	18	7	3·
2·	7	24	Tynemouth	19	5	1·
0·	6	23	Aston	23	8	0·
5·	18	23	Spalding	21	21	3·
1·	3	23	Leeds	19	3	1·
8·	31	19	Whittlesey	22	22	4·
1·	38	19	Yeovil	17	35	1·
4·	10	18	Wisbeach	20	18	11·
0·	8	18	Bristol	15	8	0·
0·	15	17	Leominster	21	15	0·
0·	53	17	Bedford	14	41	0·
6·	19	16	Maidstone	9	18	1·
2·	4	15	Hull	16	7	1·
1·	18	14	Stroud	.9	18	0·
2·	20	11	Lewes	25	19	2·
0·	5	10	Norwich	10	8	0·
18	7	9	Gravesend	13	3	3·
0·	18	9	Wycombe	8	14	0·
0·	11	4	Saffron Walden	4	14	0·

(b) *Influenza.*

b. *Influenza.*—The last severe visitation of epidemic influenza occurred late in the autumn of 1847, and in many places lasted until the early part of 1848. By far the largest proportion of the mortality upon which the death-rates shown in the tables are based happened in 1848. It is therefore impossible to draw any reliable conclusion from the present investigation, for the epidemic may have ended in some places before the close of 1847, whilst it continued in others until after the commencement of 1848. Any comparison of the death-rates in the two classes of districts would evidently be fallacious.

Influenza most fatal in unhealthy districts.

It has been satisfactorily shown by the Registrar General, in his account of the epidemic influenza of 1847, that that visitation was more fatal in metropolitan districts which ordinarily sustain a high mortality than in healthier districts; and both medical and common observations have repeatedly proved that influenza is no respecter of places, but attacks indiscriminately the inhabitants of unhealthy and of healthy districts within its line of march.

Influenza is therefore fatal in the unhealthy parts of towns, not because it there finds conditions favourable to its development, but because it there meets with a population with impaired health, unable to resist its onslaught. Probably, if the kind of investigation originated in this paper be more analytically pursued, it will hereafter be found that influenza is most fatal where pulmonary affections most prevail, and that this fatality is due to its attacking persons whose lungs have been already damaged by disease.

Epidemics of influenza.

Deaths from influenza are annually recorded in the mortuary registers of some of the larger towns and a few of the rural districts. Probably many of the cases so recorded are not influenza. There are indications in the data from which the death-rates have been calculated, that two slighter visitations of influenza occurred between 1848 and 1854; the first in 1850; the second in 1853–4. The mortality produced by these subsequent visitations was much less than that of the epidemic of 1847–8. Bedford appears to have been visited on each occasion, and hence its comparatively high average death-rate from this disease. Weardale and Lewes were also visited in 1853.

(c) *Ague. Maidstone and Gravesend.*

c. *Ague.* The large mortality produced by ague among the male inhabitants of Maidstone and Gravesend is probably caused by the men being exposed to malarious influence when at work on their several occupations, and especially by the deaths of seamen, in Gravesend, who have contracted the disease abroad, and of boatmen and bargemen employed in inland navigation at both places.

Supposed antagonism of ague and phthisis.

It has sometimes been said that malarious influence is unfavourable to the development of phthisis; that ague and phthisis are, in fact, in some measure antagonistic. The question is more interesting in a medical than a public health point of view, but may perhaps not improperly be noticed here. The death-rates from ague, phthisis, and diseases of the respiratory organs in several districts in which ague is most fatal are contrasted in the following table with the death-rates from phthisis and diseases of the respiratory organs in several districts of as nearly parallel character in other respects as it has been possible to select, but in which ague has produced no mortality.

TABLE LXVII. *Male and female death-rates from* AGUE *and* PHTHISIS.

Population in 1851.	Urban Percentage of Population.	Persons per Square Mile.	Name of District.	Death-rates.					
				Ague.		Phthisis.		Diseases of the Respiratory Organs.	
				Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
36,215	35	176	Wisbeach . .	4	11	235	262	253	236
21,290	36	194	Spalding . .	5	3	185	210	291	268
7,687	71	196	Whittlesey . .	8	4	270	276	208	165
16,243	25	174	North Witchford	7	5	222	333	268	184
13,846	29	113	Richmond (Yorkshire).	0	0	172	238	227	213
14,910	34	145	Leominster . .	0	0	193	248	245	138
17,142	26	289	Leighton Buzzard	0	0	197	296	267	183
37,386	23	547	Stroud . . .	1	0	218	275	293	236
33,562	30	264	Wycombe . .	0	0	224	331	233	204
33,831	13	191	Liskeard . .	0	0	230	228	261	204

On account of the uncertainty of the diagnosis between phthisis and some other diseases of the respiratory organs, the mortality from both is separately shown in the table. The six districts in which no deaths from ague are recorded present death-rates from phthisis and diseases of the respiratory organs which do not differ materially from the death-rates of the malarious districts. Liskeard, for example, contrasts favourably with Wisbeach; Wycombe with North Witchford; Leominster with Whittlesey; Richmond with Spalding. It would be a too hasty inference to affirm from data of so limited a character that the opinion that malarious influence is unfavourable to the developement of phthisis is altogether unfounded. The present facts at least afford it no support.

F. STRUMOUS DISEASES.

F. STRUMOUS DISEASES. Phthisis, considered in section A., and hydrocephalus, to be considered in the next section, are strumous diseases, but on account of their liability to be confounded with other diseases, different indeed in pathological character, but possessing many points of resemblance in their symptoms, I have considered it best to place them in separate classes with the diseases for which they are liable to be mistaken. There remain, therefore, for consideration, under the head of strumous diseases, only the diseases registered under the somewhat vague term scrofula, and the well-defined form of disease called tabes mesenterica.

TABLE LXVIII. *Male and female death-rates from* SCROFULA *and* TABES MESENTERICA *in the Divisions and Counties.*

Death-rates, Male, per 100,000.		Name of District.	Death-rates, Female, per 100,000.	
Tabes Mesenterica.	Scrofula.		Scrofula.	Tabes Mesenterica.
28	16	ENGLAND AND WALES . . .	13	24
44	17	London	13	33
27	15	South Eastern Counties . . .	14	25
26	17	South Midland Counties . . .	13	24
32	18	Eastern Counties	18	28
22	15	South Western Counties . . .	13	18
30	15	West Midland Counties . . .	13	27
18	14	North Midland Counties . .	12	17
28	17	North Western Counties. . .	10	23
23	14	Yorkshire	10	19
38	14	Northern Counties . . .	10	34
14	23	Monmouthshire and Wales . .	16	14
18	14	Hertfordshire	11	17
31	18	Buckinghamshire . . .	16	30
21	16	Northamptonshire . . .	12	21
29	17	Bedfordshire	11	23
28	22	Cambridgeshire	16	25
18	11	Cornwall	8	15
31	17	Gloucestershire	18	26
8	16	Herefordshire	11	9
33	15	Staffordshire	12	36
18	12	Worcestershire	10	13
37	16	Warwickshire	13	29
28	13	Leicestershire	12	12
11	13	Lincolnshire	11	14
20	15	Nottinghamshire	12	20
29	18	Cheshire	11	22
28	17	Lancashire	10	23
23	14	West Riding	10	19
46	14	Durham	11	44
40	14	Northumberland	8	34
24	14	Cumberland	9	19
28	20	Monmouthshire	12	33
16	26	South Wales	18	15
5	21	North Wales	14	4

(a) *Scrofula. More fatal in healthy than unhealthy places.*

(a) *Scrofula.* The fluctuations in the death-rates from scrofula are not large. It is upon the whole more fatal in healthy than in unhealthy districts, a circumstance which may depend upon the hereditary tendency to scrofula, showing itself in milder and more curable forms than visceral tuberculosis in such districts. It may be added that a large proportion of "scrofulous diseases" are in fact diseases of imperfect nourishment; and it would be difficult to estimate the local influences favourable to their development without being in a position to measure the proportion of poverty and privation among the inhabitants. In England scrofula is most fatal in the Eastern counties division. It is more fatal in Monmouthshire and Wales than in any of the English divisions. The agricultural counties of Cambridge and Buckingham sustain a higher proportionate mortality from scrofula than the counties of Lancashire, Staffordshire, and the West Riding of Yorkshire. Builth, Weardale, Aberystwith, Lewes, Towcester, Saffron Walden, and Newport Pagnell, districts which contain at most only a very small proportion of urban inhabitants, and where the population is scantily distributed on the surface of the earth, lose a larger proportion of their inhabitants from scrofula than the densely peopled towns of Liverpool, Birmingham, Coventry, Bradford, Wolverhampton, and Huddersfield. The general death-rates of Newport Pagnell, Towcester, and Huddersfield are alike; but, with this exception, the general death-rates of the series of town districts very considerably exceed the general death-rates of the series of country places whose death-losses from scrofula are here contrasted together. Bideford, Holsworthy, Glendale, and Haltwhistle, which are all of them remarkably healthy districts, maintain this character in respect of scrofula, but,— even supposing there is no difference in the system of registration, a circumstance very likely to occur in the recording of deaths under so vague a title as scrofula,—it is necessary to recollect a source of fallacy which may possibly influence the result. Several of these small healthy rural places send a large proportion of their young adult inhabitants to supply the ever craving requirements of labour in urban districts. Hence the proportion of persons in the early adult period of life is often comparatively small in such places. The proportion of persons between the ages of twenty and forty years in the population of England and Wales is to the proportion of young persons under twenty years of age as nearly 69 to 100. In the town districts the proportion is often much larger; but in Glendale there are less than 51, and in Bideford and Holsworthy there are only 55 persons between the ages of 20 and 40 for every 100 persons under the age of 20 years. The diseases referred to the head of scrofula are probably most fatal in early life, and will therefore seem to be less fatal than they really are in a population which contains a large proportion of the very young and the aged, as is the case in the places just referred to, unless the relative proportions of the inhabitants belonging to the several ages be taken into consideration.

More fatal to males than to females.

Scrofula is more fatal to males than to females. Cumberland among the counties is the only exception. There are several exceptions to the rule in the smaller districts; none amongst the larger towns. Such exceptions are not surprising in places like Reeth, Aberystwith, and Alston, where the male inhabitants are exposed to occupational influences which are liable to produce early death from pulmonary disease.

TABLE LXIX. *Male and female death-rates from* SCROFULA *and* TABES MESENTERICA *in Registration districts.*

Death-rates, Male, per 100,000.		Name of District.	Death-rates, Female, per 100,000.	
Tabes Mesenterica.	Scrofula.		Scrofula.	Tabes Mesenterica.
0	28	Builth	20	0
28	27	Newport Pagnell . .	17	23
67	25	Gateshead . . .	19	64
13	25	Weardale . . .	14	10
30	25	Derby	14	20
47	23	Lewes	18	39
18	23	Towcester . . .	17	17
56	22	Abergavenny . .	16	72
6	21	Aberystwith . .	22	11
51	21	Hull	11	42
29	20	Norwich . . .	17	20
12	19	Saffron Walden . .	18	25
27	18	Ulverstone . . .	16	15
63	18	Tynemouth . . .	7	57
9	17	Bromsgrove . . .	17	8
14	17	Huddersfield . .	13	16
47	17	Birmingham . .	12	39
45	17	Liverpool . . .	11	44
24	15	Bradford . . .	11	20
41	14	Coventry . . .	13	30
36	14	Wycombe . . .	10	33
56	13	Wolverhampton . .	12	54
23	13	Leominster . . .	12	21
25	13	Dudley	10	26
25	12	Alston	17	17
10	12	Farnham . . .	15	10
5	10	Blofield . . .	17	5
12	10	Knaresborough . .	11	9
33	9	Penzance . . .	8	31
8	8	Bideford . . .	8	10
2	8	Glendale . . .	8	0
36	8	Kidderminster . .	5	38
0	7	Haltwhistle . . .	13	0
7	7	Holsworthy . . .	8	3
19	6	Liskeard . . .	4	16

(b) *Tabes mesenterica.*

Comparative mortality produced by tabes mesenterica in different places.

(b) *Tabes Mesenterica.* Strumous disease of the belly, which might very properly be termed abdominal consumption, like the analogous disease in the chest, pulmonary consumption, is more fatal in urban than in rural districts. Among the great registration divisions it is most fatal in London, next in the Northern counties, the Eastern counties, and the West Midland counties, in the order in which they are here written. The urban influence over the death-rates appears very decided, but by no means uniform. Thus the death-rates from tabes mesenterica of Gateshead, Tynemouth, Abergavenny, Wolverhampton, Hull, Birmingham, Lewes, Liverpool, and Coventry are in several instances twice as large and in all not much less than twice as large as the death-rates of Newport Pagnell, Alston, Leominster, Liskeard, Towcester, Weardale, Saffron Walden, Knaresborough, Farnham, Bideford, and Aberystwith. The death-rates of Gateshead, Tynemouth, Abergavenny, and Hull are more than four times as high as the death-rates of Weardale, Knaresborough, Farnham, Bideford, and Aberystwith. On the other hand, the death-rates from tabes mesenterica of the great and densely peopled towns of Liverpool, Birmingham, and Bradford are less than the death-rates of Gateshead, Tynemouth, and Abergavenny.

Comparative mortality of the sexes.

Males usually die from tabes mesenterica in a larger proportion than females. They do so in England and Wales, and in all the great divisions, excepting Monmouthshire and Wales, where the death-rates of the sexes are equal. In Worcestershire and Nottinghamshire the sexes also die at an equal rate; but in Herefordshire, Lincolnshire, and Monmouthshire the female is higher than the male death-rate. In Abergavenny, Aberystwith, Saffron Walden, Huddersfield, Dudley, Kidderminster, and Bideford the female also exceeds the male death-rate. The rule, however, appears to be that the male exceeds the female death-rate from tabes mesenterica.

G. NERVOUS DISEASES OF CHILDREN.

G. NERVOUS DISEASES OF CHILDREN.—The three causes of death called in the Registrar-General's classification hydrocephalus, convulsions, and teething are here grouped together to form the class to which I have applied the term "nervous diseases of children." Like the class of pulmonary affections that has been already considered, they form a tolerably natural and reliable group, and much uncertainty would attend the effort to treat them separately in an investigation of the present nature. They are especially diseases of infancy and early childhood, and, as might have been expected, are much more fatal in towns than in country districts. In reference to the nomenclature of these diseases, and to the errors that might be presumed to arise from the same disease being differently classed in different places, it is well to observe that by far the largest number of the deaths caused by the three diseases is produced by convulsions, a disease of so marked a character as almost to preclude the possibility of error. Next comes hydrocephalus, the mortality from which, however, mostly falls considerably short of that occasioned by convulsions. Teething, in respect of which mistakes might more readily happen, very rarely produces more than one-seventh of the total mortality occasioned by the three diseases conjointly, and the proportion more frequently falls below than exceeds a seventh. A few examples in illustration will tend to confirm the reliability of the comparisons about to be instituted between the death-rates of different places. The death-rate for both sexes in Carnarvon from the three conjoint diseases is 510. No less than 484 of these deaths are referable to convulsions. The mortality occasioned by this very definite form of disease in Carnarvon is therefore fourteen times as great as that produced by hydrocephalus and teething together. The mortality from the three diseases in Liverpool is at the rate of 338 per 100,000, whereof 212 are attributable to convulsions and 89 to hydrocephalus. The proportion of deaths referred to convulsions in Bradford is 334 per 100,000, the average annual death-rate for this group of dis-

Convulsions.

Hydrocephalus.

Teething.

eases being 461, and 76 of the remainder being set down to hydrocephalus. In Sheffield the annual average death-rate from the three diseases conjointly is 350 per 100,000, of which 235 are attributed to convulsions, and 68 to hydrocephalus. Three-fifths of the total mortality produced by the three diseases in Alston are entered in the death register under the name of hydrocephalus.

TABLE LXX. *Male and female death-rates from the* NERVOUS DISEASES *of* CHILDREN *in the Divisions and Counties.*

Death-rates, Male, per 100,000.				Name of District.	Death-rates, Female, per 100,000.			
Teething.	Convulsions.	Hydrocephalus.	Nervous Diseases of Children.		Nervous Diseases of Children.	Hydrocephalus.	Convulsions.	Teething.
27	154	50	231	ENGLAND AND WALES.	174	37	115	22
28	102	79	209	London . .	144	52	71	21
20	98	44	162	South Eastern Counties.	122	33	73	16
17	94	36	147	South Midland Counties.	112	27	69	16
15	69	32	116	Eastern Counties	88	22	53	13
15	77	35	127	South Western Counties.	93	26	56	11
21	132	39	192	West Midland Counties.	148	28	102	18
25	214	35	274	North Midland Counties.	207	28	158	21
52	238	70	360	North Western Counties.	274	50	179	45
39	259	65	363	Yorkshire .	281	53	194	34
26	122	63	211	Northern Counties.	169	51	94	24
12	248	19	279	Monmouthshire and Wales.	227	13	203	11
13	130	28	171	Hertfordshire .	130	18	97	15
12	72	37	121	Buckinghamshire.	90	27	49	14
23	121	31	175	Northamptonshire.	144	30	94	20
7	114	30	151	Bedfordshire .	108	22	75	11
25	73	33	131	Cambridgeshire	102	24	57	21
10	65	31	106	Cornwall . .	79	25	47	7
14	91	37	142	Gloucestershire	104	26	67	11
9	84	17	110	Herefordshire .	95	15	71	9
34	195	41	270	Staffordshire .	221	30	161	30
16	100	32	148	Worcestershire	107	26	67	14
19	102	49	170	Warwickshire .	132	34	81	17
20	190	32	242	Leicestershire .	185	26	141	18
27	198	26	251	Lincolnshire .	200	23	155	22
27	238	37	302	Nottinghamshire	220	30	169	21
33	210	55	298	Cheshire . .	225	37	158	30
56	244	73	373	Lancashire .	285	53	184	48
43	270	72	385	West Riding .	300	59	203	38
33	164	73	270	Durham . .	224	65	129	30
26	108	60	194	Northumberland	155	43	88	24
16	56	47	119	Cumberland .	88	36	37	15
15	251	31	297	Monmouthshire	250	24	210	16
14	206	17	237	South Wales .	191	11	168	12
7	310	15	332	North Wales .	271	12	253	6

Comments on Table LXX.

The variations in the proportion of deaths produced by the nervous diseases of children in different places are very great. The death-rates for England and Wales are, male 231 ; female 174. The rate falls below this general average in seven of the great divisions ; exceeds it in four. The highest rates are presented by Yorkshire, the North Western counties, Monmouthshire and Wales, and the North Midland counties ; the lowest by the South Midland counties, the South Western counties, and the Eastern counties, in the order in which they are here written. The death-rate of London is less than the general average, and even contrasts favourably with the Northern counties. Cornwall, Herefordshire, Cumberland, and Buckinghamshire, among the counties, present the lowest death-rates ; the West Riding of Yorkshire, Lancashire, Cheshire, and Monmouthshire the highest. The death-rates of the West Riding and the county of Lancaster are in each sex three-fold the death-rates of Cornwall, Herefordshire, Cumberland, and Buckinghamshire, and two-fold the death-rates of Hertfordshire, Northamptonshire, Bedfordshire, Worcestershire, Gloucestershire, and Cambridgeshire. The chief manufacturing counties evidently sustain the highest mortality from the nervous diseases of children, and the more purely agricultural counties the lowest ; but the rule is not absolute, for the mortality is lower in Warwickshire than in Northamptonshire or Hertfordshire, and is very considerable in the purely agricultural county of Lincoln. The lowest rate is that of Cornwall, a mining county, and next to it stands Cumberland, where a considerable per-centage of the male inhabitants are engaged in mining and manufacturing industry, and a small per-centage of the female population are employed in the manufacture of textile fabrics. On the other hand, Monmouthshire and North and South Wales, where the men are partially employed in mining, as in Cornwall, and partially in the iron manufactures, and where the women follow no particular industrial pursuit, each sustains a high mortality from the nervous diseases of early life. Monmouthshire and the Welsh counties also present a rather high mortality from strumous diseases and from phthisis. The question of race here again presents itself to the mind ; and, although it would be hazardous to speculate upon such imperfect data as the present, it seems not unlikely that race has much influence over disease and mortality, that, as in the lower animals so in man, particular races may be especially prone to the development of particular forms of disease, and to a longer or a briefer term of life, quite irrespective of the circumstances by which individuals may happen to be encompassed. The possibility is at least worthy of being kept in view when considering the multifarious influences that combine to give its character to the public health.

High death-rates in manufacturing counties.

Monmouthshire and Wales.

The mean annual mortality caused by the nervous diseases of children varies in the registration districts from the rate of less than 40 per 100,000 persons in Glendale, which here again preserves its pre-eminence for salubrity, to about 500 in Carnarvon.

TABLE LXXI. *Male an female death-rates from the* NERVOUS DISEASES *of* CHILDREN *in Registration districts.*

Death-rates, Male, per 100,000.				Name of District.	Death-rates, Female, per 100,000.			
Teething.	Convulsions.	Hydrocephalus.	Nervous Diseases of Children.		Nervous Diseases of Children.	Hydrocephalus.	Convulsions.	Teething.
11	501	21	533	Carnarvon .	488	6	468	14
55	388	84	527	Bradford . .	396	69	281	46
65	337	82	484	Halifax . .	384	68	261	55
82	298	74	454	Manchester .	332	49	219	64
78	322	37	437	Wigan . .	354	28	263	63
23	386	24	433	Merthyr Tydfil	416	15	377	24
42	276	106	424	Leeds . .	338	81	223	34
11	378	17	406	Wrexham .	335	16	314	5
48	270	78	396	Sheffield . .	305	59	201	45
66	236	87	389	Salford . .	288	63	175	50
29	235	116	380	Liverpool .	297	81	189	27
61	248	66	375	Hull . .	279	49	183	47
77	228	51	356	Blackburn .	264	34	164	66
41	241	53	335	Houghton-le-Spring.	264	40	199	25
40	209	78	327	Newcastle-on-Tyne.	299	65	198	36
29	180	99	308	West Derby .	224	74	125	25
35	186	74	295	Chorlton . .	227	57	139	31
55	210	29	294	Wolverhampton	257	18	191	48
30	103	91	224	Easington .	186	87	73	26
24	132	67	223	Tynemouth .	163	39	103	21
21	115	69	205	Birmingham .	156	44	96	16
29	128	48	205	Bristol . .	137	30	88	19
27	131	25	183	Hemel Hempstead.	98	13	72	13
16	134	10	160	Romney Marsh	182	32	134	16
14	113	29	156	Saffron Walden	88	18	64	6
28	84	34	146	Ipswich . .	107	25	65	17
7	82	32	121	Blofield . .	61	17	32	12
19	63	17	99	Garstang . .	79	9	61	9
3	90	3	96	Builth . .	44	0	44	0
5	34	42	81	Holsworthy .	44	31	10	3
22	7	44	73	Haltwhistle .	52	20	20	12
14	23	14	51	Bootle . .	50	25	10	15
8	8	33	49	Alston . .	50	25	4	21
6	14	23	43	Glendale . .	32	15	13	4

Comments on Table LXXI.

In general terms, the mortality is lowest amongst the thinly scattered population of rural districts ; highest in the large towns The highest death-rates occur in the manufacturing towns of Bradford, Halifax, Manchester, and Leeds, in the mixed mining and manufacturing district of Wigan, and in the three Welsh districts, Carnarvon, Merthyr Tydfil, and Wrexham. The lowest death-rates among the hundred and five districts are found in Blofield, Garstang, Builth, Holsworthy, Haltwhistle, Bootle, Alston, and Glendale. These are all rural places, and, excepting Alston, where a large proportion of the men are employed in lead-mining, and Garstang, where a small proportion of the adults of both sexes are employed in the cotton manufacture, they are inhabited by an almost purely agricultural population.

But the deaths are by no means in exact proportion to the more or less rural or urban character of districts. Easington has a higher death-rate than Tynemouth, Birmingham, or Bristol; Hemel Hempstead, Romney Marsh, and Saffron Walden have higher death-rates than Ipswich. The small town of Houghton-le-Spring has a higher death-rate than either Bristol or Birmingham, and Carnarvon has a higher death-rate than Liverpool.

High death-rate of Carnarvon.

Of the districts comprised in this investigation, Carnarvon, as already said, has the highest death-rate from the nervous diseases of children. But Carnarvon is by no means a singularly un-

Mortality of Carnarvon and Liverpool compared.

healthy place. Its general death-rate for the septennial period 1848–54 is a little under the general death-rate of England and Wales, and nearly coincides with the death-rate of the Welsh division in which it is situated. The public health of Carnarvon, measured by the general death-rate, is very superior to the public health of Liverpool. For each five deaths out of a given proportion of the inhabitants of Carnarvon of all ages and both sexes, eight occur in a similar number of the inhabitants of Liverpool. Yet for every hundred of the males of Liverpool that die from these children's diseases more than one hundred and forty perish in Carnarvon. This circumstance is the more remarkable as the proportionate death-rate of children under five years of age, from all causes, in Liverpool is more than double that in Carnarvon. The male children of Liverpool below the age of five years annually perish at the rate of 14,938 per 100,000; the deaths of the same class in Carnarvon are only at the rate of 6,100 per 100,000. The causes of death must therefore differ much in the two places. A casual death from hydrocephalus at a more advanced age, and perchance the accidental but rare registration of other convulsive affections under the head of "convulsions," being excepted, the deaths from the group of diseases now under consideration may be considered as occurring in children under five years of age. Adopting this view, and employing the infantile inhabitants of each sex in the several places as divisors, the death-rates from the nervous diseases of children have been calculated for twenty districts, and are shown in the subjoined table side by side with the death-rates from all causes, from diarrhœa, and from pulmonary affections.

TABLE LXXII. *Death-rates of male and female children from all causes, nervous diseases, pulmonary affections, and diarrhœa.*

Death-rates for Persons under Five Years of Age, Male, per 100,000.				Name of District.	Death-rates for Persons under Five Years of Age, Female, per 100,000.			
All Causes.	Diarrhœa.	Pulmonary Affections.*	Nervous Diseases of Children.		Nervous Diseases of Children.	Pulmonary Affections.*	Diarrhœa.	All Causes.
3,740	108	461	1,062	New Forest †	795	765	168	3,502
7,134	152	1,558	847	Towcester †	845	1,294	288	6,189
3,499	57	259	302	Glendale †	257	166	60	3,173
3,704	0	448	561	Haltwhistle †	386	207	59	3,385
6,150	425	496	1,418	Easington	1,177	371	380	5,513
6,581	242	832	2,274	Houghton-le-Spring.	1,783	665	181	5,561
6,950	169	1,231	836	Redruth	673	1,062	161	6,376
4,288	29	561	355	Alston †	354	324	28	3,453
4,321	82	633	1,458	Reeth †	725	558	83	3,376
6,100	28	390	3,886	Carnarvon	3,779	312	42	6,171
14,938	1,793	3,092	3,107	Liverpool	2,514	2,364	1,582	13,985
10,008	890	2,072	1,646	Bristol	1,300	1,858	715	8,987
10,203	839	1,465	2,938	Hull	2,367	1,323	813	9,261
10,497	1,567	2,094	1,493	Birmingham	1,167	1,913	1,337	9,304
12,050	1,188	2,072	2,132	Wolverhampton	1,741	2,132	1,024	10,680
10,025	851	1,936	2,426	Wolstanton	1,936	1,757	649	8,804
13,539	1,945	2,009	3,496	Manchester	2,733	1,695	1,613	11,833
12,047	1,418	1,913	3,301	Leeds	2,752	1,843	1,211	10,930
9,036	548	1,544	2,330	Macclesfield	1,723	1,342	557	7,602
7,266	392	1,157	1,832	Leek	1,362	1,165	207	6,170

* Pulmonary affections comprise the several causes of death classed by the Registrar General as diseases of the respiratory organs and phthisis.

† The population in these places is small, and of course the deaths few. The addition or subtraction of a very few deaths would have materially affected the death-rates.

Comments on Table LXXII.

Liverpool and Carnarvon.

Whilst the average mortality from all causes among the children of Liverpool is more than double that in Carnarvon, in proportion to their respective populations, the proportion of deaths from pulmonary affections under five years of age is more than seven times as high in the former as in the latter. The male children of Carnarvon die from pulmonary affections at the annual rate of 390; those of Liverpool at the annual rate of 3,092 per 100,000. As might be inferred, from the great prevalence of pulmonary diseases in Liverpool, measles and hooping-cough, diseases chiefly of childhood, but not exclusively of early childhood, which are most frequently fatal from pulmonary complications, are also much more fatal in Liverpool than in Carnarvon. The male death-rate from the two diseases in Liverpool is 192; that in Carnarvon 78 per 100,000. Scarlatina, an analogous disease, but a disease which does not implicate the organs of respiration, is about equally fatal in Liverpool and Carnarvon. Diarrhœa, again, is exceedingly destructive among the children of Liverpool, to whom it proves fatal in the annual proportion of 1,793 per 100,000 male children below the age of five years. The mortality from diarrhœa in Carnarvon is most insignificant.

Birmingham, Hull, and Bristol.

If the mortuary statistics of the infantile population of other towns be examined, the same absence of uniform relation is found to exist between the proportion of deaths from all causes and from particular diseases. Birmingham, Hull, and Bristol do not differ much in the proportion of children that die under five years of age in each. Yet the mortality from the nervous diseases of children is twice as high in Hull as in Birmingham, and not much less than twice as high as in Bristol. The male death-rates in children under five years of age from this group of diseases in the three places, are,—Hull 2,938, Birmingham 1,493, Bristol 1,646 per 100,000. The death-rates of male children from all causes in the same towns are,—Hull 10,203, Birmingham 10,497, Bristol 10,008. The deaths from all causes among the male children of Hull are to the deaths of male children in Bristol as 102 to 100, out of an equal number of the infantile male inhabitants of each place; but the deaths from the nervous diseases of children in Hull and Bristol are as 178 to 100. The infantile mortality of these places is in fact produced by different diseases. Thus pulmonary affections, which on the average annually prove fatal to the male children of Hull in the proportion of 1,465 per 100,000, destroy the much larger proportion of 2,072 in Bristol and of 2,094 in Birmingham. Measles and hooping-cough are jointly somewhat more fatal in Birmingham than in Bristol; in Bristol than in Hull. Scarlatina is most fatal in Bristol; least fatal in Hull. Diarrhœa is fatal to the male children of each of the three towns, but it is very nearly twice as fatal in Birmingham in proportion to the population as in Bristol or Hull. The proportion of deaths from diarrhœa, per 100,000, is 1,567 in Birmingham, 890 in Bristol, and 839 in Hull. If, again, the mortality sustained by the children of Manchester be compared with the mortality of the children of

Manchester and Wolverhampton.

Wolverhampton, a similar absence of *definite* relation between the mortality from all causes and from nervous diseases will be observed. The average annual death-rates of the male children of the two districts from all causes, are,—Manchester 13,539, Wolverhampton 12,050, that is, the death-rate of boys in Manchester is to the death-rate of boys in Wolverhampton as 112 to 100. The nervous diseases of children, however, are fatal to the children of these towns in very different proportions. The death-rates of males are—Manchester 3,496, Wolverhampton 2,132 per 100,000, that is, the death-rate of boys from this group of diseases in Wolverhampton being considered as 100, the death-rate in Manchester would be 163. Pulmonary diseases are about equally fatal in Manchester and Wolverhampton, and so likewise are measles and hooping-cough conjointly; but scarlatina is fatal to 147 children per 100,000 in the former, as compared with 105 in the latter, and diarrhœa, which is fatal to 1,945 male children per 100,000 in Manchester, as compared with 1,188 in Wolverhampton, is thus fatal to the boys of the two places in exactly the same proportion as nervous diseases, the diarrhœal death-rate of Manchester being to the diarrhœal death-rate of Wolverhampton as 163 to 100. It would be interesting, but it is unnecessary, to pursue this line of investigation in respect of the other towns in the table. Enough has probably been done to illustrate the varying proportions in which different causes of death unite to make up the general death-rate of children.

Nervous diseases more fatal to male than to female children.

With one or two unimportant exceptions, which occur in places of such small size that the occurrence of a very few deaths more or less would materially alter the death-rate, the male death-rate from the nervous diseases of children invariably exceeds the female. It is not a little remarkable, however, that the proportion between the male and female death-rates varies much in different districts. The widest differences exist in Builth, Blofield, Holsworthy, Hemel Hempstead, and Saffron Walden, where the male death-rate being counted as 100, the female would be 46 in Builth; 50 in Blofield; 54 in Holsworthy; 53 in Hemel Hempstead; and 55 in Saffron Walden. These are, however, districts in which the population is small, and the death-rates therefore liable to fluctuation from accidental causes. The male death-rate from the nervous diseases of children for England and Wales being considered as 100, the female would be 75, or just one-fourth less. The widest difference among the great divisions exits in London, where, the male death-rate being 100, the female would be only 68; the smallest difference is in the Northern counties and in Monmouthshire and Wales, where the female death-rates would be 80 and 81 respectively, the male being considered as 100. The male death-rate in each case being considered as 100, the female death-rates in the other divisions would be, South Eastern counties, Eastern counties, and North Midland counties, each 75; South Midland counties and North Western counties, each 76; West Midland counties and Yorkshire, each 77; and the South Western counties, 73. Among the larger

Comparison of male and female death-rates.

districts, Merthyr Tydfil and Newcastle-on-Tyne are the places in which the death-rates of the sexes approximate the nearest; Redruth, Nottingham, Leicester, and Derby, those in which they most diverge. The male death-rate in each district being considered as 100, the female death-rates from the nervous diseases of children in the following districts would be Redruth 66, Nottingham 67, Leicester 68, Derby 68, West Derby 72, Manchester 73, Tynemouth 73, Salford 74, Hull 74, Blackburn 74, Glendale 74, Bradford 75, Chorlton 76, Sheffield 77, Liverpool 78, Halifax 79, Leeds 79, Wigan 81, Wrexham 82, Gateshead 84, Abergavenny 84, Newcastle-on-Tyne 91, and Merthyr Tydfil 96. These differences are remarkable, and much greater than could arise from any discrepancies between the proportions of male and female children and male and female adults in the different places. They well show how much room still remains for inquiry into the nature of the causes which modify the public health. Fallacies from difference of diagnostic skill or of opinion on the part of the medical practitioners who record the causes of death can scarcely modify these results, for the death-rates of the sexes have in each case been calculated for the same period of time, and the causes of death in each sex have consequently been certified by the same medical men.

Disproportion in the death-rates of the sexes.

Similar disproportion in the births of boys and girls.

This remarkable and variable disproportion in the death-rates of the sexes from the same class of diseases is in some respects parallel to the equally remarkable disproportion between the comparative number of male and female births in different districts. The male births in this country are nearly in the proportion of 104 to each 100 births of females. This proportion is, however, by no means uniform in all parts of the country, but varies so much that whilst in some counties the male births but little exceed those of females, in other counties the excess amounts to eight and in one county to nine per cent. No doubt there is some definite although at present recondite cause for the diversity. So unquestionably is there some equally definite cause for the wide fluctuations here shown to exist in the mortality of the two sexes from these diseases of children in different districts.

Residence in towns a principal cause of nervous diseases in children.

Notwithstanding the great diversities in the proportion of deaths from the nervous diseases of children that have been shown to exist in different districts, it is quite certain that the circumstances attendant on a town residence are largely operative in the production of these diseases. Into the nature of these circumstances it is not here necessary to inquire, but the fact that urban influences have really much to do with the causation of these diseases seems to be exemplified in the mortuary statistics of the two adjacent districts of Easington and Houghton-le-Spring in the county of Durham. Both places are similarly situated in regard to general atmospherical influences; both are tolerably salubrious; and the prevalent industrial occupations of both are nearly identical. Only twelve in each hundred of the adult male inhabitants of Easington are engaged in agriculture. In Houghton-le-Spring, the proportion of the population engaged

Houghton-le-Spring and Easington.

in agricultural pursuits amounts to ten per cent. Fifty per cent. of the adult males of Easington are coal miners. In Houghton-le-Spring the number of coal miners amounts to nearly forty-eight in each hundred adult males. The most obvious difference between the districts is, that the small town of Houghton-le-Spring, which contained less than 4,000 inhabitants, in 1851, comprised within the one district, has no parallel in the other. There is indeed one circumstance that should not be overlooked in this comparison, and it is a circumstance that would certainly modify any conclusions drawn from minor differences of death-rate. A coal-mining population is frequently a fluctuating population, for when a colliery is laid in, the miners remove to other neighbourhoods; and of course the opening of a new colliery collects a population in places which in all probability were previously unoccupied by inhabitants. New mines were opened in the Easington district between the census of 1841 and that of 1851; and the population in consequence increased 38 per cent. in the ten years. The increase in Houghton-le-Spring during the same period was a little under 22 per cent. Two modes of obviating any source of error that might arise from this cause, however, exist; the one is the comparison of the proportion of the total mortality of each place caused by these diseases; the other is the comparison of the death-rates of children under the age of five years in the two districts. Whilst in Easington the deaths from the nervous diseases of children during the entire septennial period only amounted to 12 per cent. of the entire mortality, the proportion was one-third more in Houghton-le-Spring, where 16 per cent. of all the deaths were caused by the same group of diseases. The general death-rate of boys under five years of age in Easington is 6,150; that in Houghton-le-Spring 6,581 per 100,000. The death-rates from the nervous diseases of children are, Easington 1,418, Houghton-le-Spring 2,274. The general death-rates of boys thus being in the proportion of 100 in Easington to 107 in Houghton-le-Spring, the death-rates of the same class from nervous diseases are in the proportion of 100 to 160. The approximation of the general death-rates of children in the two places seems to show that the supposed disturbing cause has really had little influence on the rate of mortality in children; the large divergence in the death-rates of children from the nervous diseases of early life seems to prove that the infantile population of the one place is exposed to some noxious influences which are at least less intense in the neighbouring districts.

Mortality highest in manufacturing towns where female labour is in request.

There is one interesting and suggestive fact that must not be passed unnoticed. It is, that the mortality from the nervous diseases of children is not only higher in towns than in rural districts, but is also higher in manufacturing than in other towns, and highest in places where female labour is most in request. Thus it is higher in Bradford, Halifax, Manchester, Wigan, and Leeds, than in Hull, Newcastle-on-Tyne, Birmingham, or Bristol. It appears to be higher in places where females work in factories than in their homes; higher, for example, in Macclesfield than in Coventry. Even in rural communities the influence of female occupation over the mortality of children seems apparent; the mortality produced by these diseases in Glendale, Haltwhistle, Builth, Holsworthy, and Farnham being much less than the mortality caused by the same diseases in Leighton Buzzard, Hemel Hempstead, Pateley Bridge, or Knaresborough. The rule, if it be one, is not without many exceptions, and the facts here mentioned can only be received at present as suggestive of more careful inquiry and observation. To work out the question to its full extent, and to determine whether there is more than an apparent relation between the employment of females in other pursuits than the ordinary social and domestic duties of their sex and the deaths of young children, would require much time, and a minute and extensive acquaintance with numerous districts, which could only be acquired by making the subject one of special inquiry.

H. APOPLEXY AND PARALYSIS.

H. APOPLEXY AND PARALYSIS are most fatal in London, the South Eastern counties, and the South Western counties; least fatal in the North Western counties, the North Midland counties, and Monmouthshire and Wales.

TABLE LXXIII. *Male and female death-rates from* APOPLEXY *and* PARALYSIS *in the Divisions and Counties.*

Death-rates, Male, per 100,000.			Name of District.	Death-rates, Female, per 100,000.		
Paralysis.	Apoplexy.	Apoplexy and Paralysis.		Apoplexy and Paralysis.	Apoplexy.	Paralysis.
42	46	88	ENGLAND AND WALES	88	44	44
50	58	108	London	101	54	47
44	56	100	South Eastern Counties	104	57	47
43	46	89	South Midland Counties	97	48	49
42	43	85	Eastern Counties	95	46	49
44	52	96	South Western Counties	100	51	49
41	46	87	West Midland Counties	87	44	43
38	37	75	North Midland Counties	76	36	40
38	40	78	North Western Counties	75	36	39
34	48	82	Yorkshire	78	43	35
42	38	80	Northern Counties	82	35	47
39	25	64	Monmouthshire and Wales	64	23	41
32	54	86	Hertfordshire	98	53	45
42	42	84	Buckinghamshire	104	50	54
47	41	88	Northamptonshire	96	38	58
54	40	94	Bedfordshire	99	49	50
26	40	66	Cambridgeshire	76	42	34
45	37	82	Cornwall	92	40	52
78	68	146	Gloucestershire	98	45	53
56	49	105	Herefordshire	91	48	43
30	39	69	Staffordshire	71	38	33
45	55	100	Worcestershire	87	44	43
41	49	90	Warwickshire	95	49	46
41	38	79	Leicestershire	81	39	42
35	36	71	Lincolnshire	68	31	37
40	37	77	Nottinghamshire	73	34	39
40	41	81	Cheshire	82	37	45
37	40	77	Lancashire	74	36	38
33	48	81	West Riding	75	43	32
35	35	70	Durham	69	32	37
56	43	99	Northumberland	99	39	60
41	37	78	Cumberland	83	34	49
29	35	64	Monmouthshire	50	24	26
34	23	57	South Wales	57	22	35
51	23	74	North Wales	74	23	51

Gloucestershire, among the counties, presents the highest death-rate, and next in succession to it follow Herefordshire, Worcestershire, and Buckinghamshire; South Wales, Monmouthshire, Staffordshire, and Cambridgeshire present the lowest death-rates.

Of the districts comprised in the subjoined table, Worcester presents the highest, Chesterfield, Merthyr Tydfil, and Easington, the lowest death-rates. The mortality from the two diseases is nearly twice as high in Hull, Bristol, and Norwich as in Dudley, Chesterfield, or Merthyr; but the mortality bears no definite relation to either the size of town, districts, or the density of their population. Manchester and Birmingham sustain a smaller proportionate mortality from these causes than Berkhampstead, Tynemouth, and Gateshead; and Liverpool sustains a smaller proportionate mortality than Macclesfield, Coventry, and Newcastle-on-Tyne. There is no fixed relation between the male and female death-rates, but they correspond more frequently than in some of the diseases previously investigated. Thus, the males and females die at equal or nearly equal rates in Bristol, Norwich, Berkhampstead, Tynemouth, Newcastle, Coventry, Macclesfield, Bromsgrove, Huddersfield, Bradford, and Dudley; in Worcester, Hull, Gateshead, Manchester, Liverpool, and Abergavenny the male very considerably exceeds the female death-rate. In Stoke-upon-Trent, Wolstanton, Penzance, Carnarvon, Alcester, and Birmingham the female exceeds the male death-rate.

TABLE LXXIV.

Death-rates from APOPLEXY *and* PARALYSIS *in Registration districts.*

Death-rates, Male, per 100,000.			Name of District.	Death-rates, Female, per 100,000.		
Paralysis.	Apoplexy.	Apoplexy and Paralysis.		Apoplexy and Paralysis.	Apoplexy.	Paralysis.
69	79	148	Worcester	123	58	65
58	59	117	Hull	97	46	51
52	64	116	Bristol	116	61	55
69	44	113	Norwich	113	47	66
57	55	112	Berkhampstead . . .	114	44	70
49	60	109	Tynemouth	104	53	51
41	64	105	Gateshead	87	47	40
46	49	95	Manchester	82	38	44
35	56	91	Birmingham . . .	98	56	42
51	38	89	Newcastle-on-Tyne . .	87	42	45
43	44	87	Coventry	87	39	48
65	39	104	Alcester	77	46	31
40	42	82	Macclesfield	82	41	41
38	44	82	Liverpool	67	35	32
28	51	79	King's Norton . . .	74	39	35
60	16	76	Carnarvon	84	21	63
32	44	76	Bromsgrove	78	45	33
35	40	75	Stoke-upon-Trent . .	89	49	40
35	37	72	Blackburn	67	31	36
45	26	71	Penzance	82	30	52
26	42	68	Halifax	72	42	30
30	36	66	Chorlton	73	38	35
33	31	64	Huddersfield . . .	65	80	35
31	32	63	Rochdale	66	31	35
20	41	61	Bradford	61	39	22
23	36	59	Abergavenny . . .	42	21	21
23	35	58	Wolstanton	69	36	33
29	29	58	Houghton-le-Spring . .	61	25	36
17	39	56	Dudley	56	35	21
24	27	51	Holsworthy	67	36	31
24	25	49	Chesterfield	60	31	29
22	21	43	Merthyr Tydfil . . .	51	28	23
15	25	40	Easington	43	15	28

For these differences it is impossible to suggest any reasonable explanation from the present data. Apoplexy and paralysis are mostly secondary diseases that occur as the result of a primary affection. Their causes must, therefore, be sought in the circumstances that produce the primary affections from which they spring. They are, moreover, diseases rather of middle and advanced life, and hence deaths from them are most likely to occur in excess in places where the mortality in early life is small. Natural decay often terminates in one of these forms of disease, either from disease of the nervous structure itself, in consequence of impaired nutrition, or from pressure on the nervous centres, the result of effusion, itself the consequence of diseased blood vessels. The average rates of mortality from apoplexy and paralysis are separately shown in the annexed table. There is no fixed relation in the death-rates from the two diseases, and practically they are best considered together in investigations of the present kind.

I. Rheumatic Fever and Rheumatism.

I. Rheumatic Fever and Rheumatism. Apoplexy and paralysis are commonly the fatal terminations of preceding and often unsuspected diseases. Rheumatic fever and rheumatism, on the contrary, most frequently prove fatal by the production of secondary diseases; and hence deaths really the ultimate consequence of rheumatism appear in the death register under a different name. The reason for placing rheumatism among the diseases selected for the investigation was that rheumatic fever is referred to the class of zymotic diseases in the arrangement used by the Registrar General. The direct mortality produced by rheumatism in any form constitutes but a very small fraction of the deaths in any district; and, so far as my investigation is to be relied upon, the mortality it produces in unhealthy towns is not sensibly greater than the mortality which it produces in rural communities. Other diseases may sometimes, perhaps, be registered under the name of rheumatism; and in the case of a disease that in its uncomplicated form very rarely indeed proves fatal, this circumstance would materially lessen the reliability of the local statistics, a very few deaths more or less materially altering the death-rate. For this reason it is all but impossible to institute any reliable comparison between the mortality of small rural communities and that of large towns.

Table LXXV. *Death-rates from* Rheumatic Fever *and* Rheumatism *in the Divisions and Counties.*

Name of District.	Death-rates from Rheumatic Fever and Rheumatism.		Name of District.	Death-rates from Rheumatic Fever and Rheumatism.	
	Male per 100,000.	Female per 100,000.		Male per 100,000.	Female per 100,000.
England and Wales	10	9	West Midland Counties	11	9
London	13	11	North Midland Counties	9	9
South Eastern Counties	10	9	North Western Counties	11	11
South Midland Counties	10	8	Yorkshire	10	10
Eastern Counties	9	8	Northern Counties	8	8
South Western Counties	9	7	Monmouthshire and Wales	10	11
Hertfordshire	12	7	Lincolnshire	7	6
Buckinghamshire	8	8	Nottinghamshire	11	10
Northamptonshire	7	8	Cheshire	12	11
Bedfordshire	7	9	Lancashire	11	11
Cambridgeshire	10	5	West Riding	10	11
Cornwall	8	6	Durham	8	7
Gloucestershire	9	8	Northumberland	7	7
Herefordshire	11	10	Cumberland	10	11
Staffordshire	12	9	Monmouthshire	10	10
Worcestershire	11	9	South Wales	10	11
Warwickshire	12	9	North Wales	11	11
Leicestershire	8	9			

Rheumatic fever and rheumatism are together more fatal in London than in any other of the eleven great registration divisions. Next to London they are most fatal to the inhabitants of the North-western counties; they are least fatal in the Northern counties and the South-western counties. Lincolnshire, Northumberland, and Durham, among the counties, present the lowest rates of mortality; Cheshire, Lancashire, Staffordshire, and Warwick present the highest. The male usually exceeds the female death-rate from rheumatic affections. In a few cases the male and female death-rates are equal. In the counties of Northampton, Bedford, Leicester, in the West Riding of Yorkshire, and in Cumberland and South Wales, the female slightly exceeds the male death-rate. The largest proportion of the deaths from rheumatic affections are recorded under the head of rheumatism, very few indeed being attributed to rheumatic fever. The annexed table shows the mortality from these causes, separately and conjointly, in a few of the chief districts.

TABLE LXXVI. *Death-rates from* RHEUMATIC FEVER *and* RHEUMATISM *in Registration districts.*

Death-rates, Male, per 100,000.				Death-rates, Female, per 100,000.		
Rheumatism.	Rheumatic Fever.	Rheumatic Fever and Rheumatism.	Name of District.	Rheumatic Fever and Rheumatism.	Rheumatic Fever.	Rheumatism.
19	2	21	Coventry	15	2	13
11	4	15	Huddersfield	10	3	7
11	3	14	Bristol	12	2	10
9	5	14	Blackburn	11	3	8
8	5	13	Bromsgrove	3	1	2
11	2	13	Dudley	9	2	7
10	2	12	Abergavenny	11	3	8
10	2	12	Birmingham	9	2	7
9	3	12	Aston	7	2	5
8	3	11	Halifax	15	6	9
9	2	11	Macclesfield	12	1	11
9	2	11	Leeds	11	1	10
7	4	11	West Derby	9	2	7
6	5	11	Wolverhampton	9	3	6
6	4	10	Chorlton	9	3	6
9	1	10	Salford	9	1	8
5	4	9	Basford	9	3	6
7	2	9	Stoke-upon-Trent	8	2	6
5	3	8	Holywell	8	3	5
6	2	8	Hull	8	3	5
7	1	8	Preston	9	3	6
6	2	8	Sheffield	9	2	7
5	2	7	Liverpool	9	3	6
5	2	7	Manchester	9	2	7
5	2	7	Penzance	7	4	3
4	2	6	Bradford	10	3	7
3	1	4	Merthyr Tydfil	3	0	3

K. CARBUNCLE AND PHLEGMON.

K. CARBUNCLE AND PHLEGMON. The mortality occasioned by carbuncle and phlegmon is exceedingly inconsiderable, but it has been on the increase during the last eight or nine years. The largest proportion of the deaths are recorded under the name of phlegmon; but, as mistakes of registration are not improbable, the two diseases may most satisfactorily be considered together.

Conjointly, these diseases are most fatal in the South Midland counties, the Eastern counties, and the West Midland counties; least fatal in Monmouthshire and Wales. With these exceptions, there is great uniformity in the death-rates from carbuncle and phlegmon in the other great registration divisions of the country. There is greater diversity in the death-rates of the several counties.

TABLE LXXVII. *Death-rates from* CARBUNCLE *and* PHLEGMON *in the Divisions and Counties.*

Name of District.	Death-rates from Carbuncle and Phlegmon.		Name of District.	Death-rates from Carbuncle and Phlegmon.	
	Male per 100,000.	Female per 100,000.		Male per 100,000.	Female per 100,000.
ENGLAND AND WALES	4·0	2·5	West Midland Counties	5·0	2·7
London	4·0	2·0	North Midland Counties	4·0	2·7
South Eastern Counties	4·0	2·3	North Western Counties	4·0	2·4
South Midland Counties	6·0	3·8	Yorkshire	4·0	2·2
Eastern Counties	6·0	3·2	Northern Counties	4·0	3·1
South Western Counties	4·0	2·4	Monmouthshire and Wales	2·0	1·5
Hertfordshire	5·0	2·5	Lincolnshire	3·0	2·5
Buckinghamshire	8·0	3·3	Nottinghamshire	4·0	2·3
Northamptonshire	8·0	5·7	Cheshire	3·0	2·4
Bedfordshire	3·0	3·4	Lancashire	4·0	2·4
Cambridgeshire	5·0	3·9	West Riding	4·0	2·5
Cornwall	5·0	3·3	Durham	3·0	3·4
Gloucestershire	3·0	2·2	Northumberland	5·0	3·7
Herefordshire	4·0	2·0	Cumberland	5·0	2·0
Staffordshire	7·0	3·3	Monmouthshire	1·0	1·9
Worcestershire	4·0	2·3	South Wales	2·0	2·0
Warwickshire	4·0	2·5	North Wales	1·0	0·6
Leicestershire	5·0	3·1			

The mortality of males in Buckinghamshire and Northamptonshire is twice as high per 100,000 as the average mortality of England and Wales, eight times as high as the mortality of Monmouthshire and North Wales, and four times as high as the mortality of South Wales. The death-rates of Staffordshire, Hertfordshire, Cambridgeshire, Cornwall, Leicestershire, Northumberland, and Cumberland exceed the death-rate of England and Wales. The death-rates of Bedfordshire, Gloucestershire, Lincolnshire, Cheshire, Durham, Monmouthshire, and North and South Wales fall below the general average. The widest differences are in the male death-rates, the diversities in the female death-rates of different divisions and counties being much smaller. The mortality from these diseases is too small to admit of any accurate comparison of the death-rates of smaller districts, but the average shown in the tables of district death-rates in the Appendix seems at least to prove that urban influences do not aggravate the mortality from this cause. The evidence, such as it is, appears to indicate that the more sthenic condition of residents in rural places is favourable to these diseases rather than the more depressed state of the inhabitants of urban districts.

PROPORTIONS IN WHICH THE DEATHS FROM CERTAIN DISEASES ENTER INTO

Thus far, our attention has been exclusively devoted to the varying rates of mortality from the several diseases in different places. It is now desirable, in conclusion, briefly to inquire into the proportion of the entire mortality produced by certain of the diseases comprised in this investigation in a few of the particular

THE PRODUCTION OF THE ENTIRE MORTALITY.

districts. The annexed table shows the proportion in each thousand deaths in the Registration Divisions of England and Wales, and in twenty of the Registration Districts that is produced by each of the more important classes of disease that have been brought under consideration in the preceding part of this paper. The comparative death-rates of influenza have been already shown to be so unreliable; ague and carbuncle and phlegmon produce so small a mortality; and the proportion of deaths produced by croup, by apoplexy and paralysis, and by rheumatic fever and rheumatism, seem to be so little influenced by external circumstances, that they have been omitted from the present calculation. The main facts as regards croup, apoplexy and paralysis, and rheumatic fever and rheumatism, may be briefly summed up in a few sentences.

Croup.

The proportion of deaths produced by croup in the several places in the table varies from 4 in each 1,000 male deaths in Hull to 24 in Reeth. Ten deaths in each 1,000 are attributed to croup in England and Wales; fifteen in the North Western counties and in Monmouthshire and Wales, and only six in London and the Eastern counties. The proportion is usually somewhat less in the female than the male. The exceptions, so far as I have examined the subject, occur only in very small districts where accidental circumstances may readily modify the proportion. The number of deaths in each 1,000 male deaths from all causes produced by apoplexy and paralysis varies from 19 in Redruth and Wolverhampton to 55 in Towcester and 68 in New Forest. In every 1,000 male deaths in England and Wales 37 are referable to apoplexy and paralysis; 39 in every 1,000 female deaths are produced by the same diseases. The proportions in London are, male 39; female 43; in the South Eastern counties, male 48; female 53; in the North Western counties, male 28; female 29. The proportions in Yorkshire are 33 in each 1,000 deaths, of both sexes; but with this exception the proportion of each 1,000 deaths of females produced by these diseases of more advanced life in large districts is larger than the proportion in the male; the exceptions which occur only in small places are probably referable to accidental circumstances. Rheumatic fever and rheumatism produce four in each thousand deaths of either sex in England and Wales; and the proportion varies little in the great divisions of the country. In the South Midland counties, the Eastern counties, and the South Western counties, the proportions are 4 male deaths and 3 female deaths in each 1,000 deaths of either sex from all causes. In Monmouthshire and Wales the proportions are 4 male and 5 female deaths in every 1,000 deaths of each sex respectively; in the North Western counties 3 male and 4 female deaths; and in the Northern counties, 3 male and 3 female deaths in each 1,000 deaths of either sex from all causes are referable to rheumatic affections. The proportion does not vary much from the general average in the larger districts, but is a little less in the great unhealthy cities, and sometimes a little more in healthier places. Three deaths in each 1,000 deaths of each sex are produced by rheu-

Apoplexy and Paralysis.

Rheumatic Fever and Rheumatism.

matic affections in Wolverhampton, Leeds, Wolstanton, and Redruth; in Liverpool, two female deaths and not quite two male deaths in each thousand deaths of either sex are produced by rheumatic fever and rheumatism; in Manchester, two male and three female deaths; in Birmingham, four male and three female deaths; and in Bristol and Macclesfield, four deaths in each 1,000 deaths of each sex are referable to the same cause.

TABLE LXXVIII.
Proportion in which the deaths from certain diseases enter into the production of the whole mortality in the Divisions and in certain Registration districts.

PROPORTION in which each of the under-mentioned Causes enters into the Production of each 1,000 deaths in each Sex, in the several Registration Divisions of England and Wales, and in the several under-mentioned Districts.

Name of District.	Pulmonary Affections.*a*		Contagious Diseases.*b*		Alvine Flux.*c*		Typhus and Erysipelas.		Strumous Diseases.*d*		Nervous Diseases of Children.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
ENGLAND AND WALES . .	240	242	88	92	72	72	47	50	18	16	97	78
London . .	276	252	106	110	107	114	48	48	22	19	76	61
South Eastern Counties .	240	242	66	70	62	59	53	57	20	19	78	62
South Midland Counties .	225	233	67	68	55	53	57	65	20	17	67	53
Eastern Counties	233	254	70	72	49	43	53	53	23	22	55	43
South Western Counties .	242	233	85	84	46	45	47	52	17	15	60	47
West Midland Counties .	244	244	84	89	69	66	45	50	18	17	80	66
North Midland Counties .	219	240	82	84	42	39	44	49	15	13	129	99
North Western Counties .	248	262	104	110	88	90	44	49	16	12	128	106
Yorkshire .	219	225	92	100	74	77	42	43	15	12	148	121
Northern Counties . .	204	209	89	92	78	83	38	40	22	20	91	77
Monmouthshire and Wales .	236	233	86	93	52	50	54	53	16	14	125	108
New Forest .	249	295	70	82	28	38	58	65	12	10	85	62
Towcester .	204	239	58	46	63	79	60	68	17	14	49	42
Glendale . .	138	148	129	122	39	34	47	59	6	5	27	21
Haltwhistle .	201	231	28	31	15	4	36	14	4	7	44	30
Easington .	123	150	132	131	74	75	25	34	22	20	124	105
Houghton-le-Spring . .	177	194	70	83	41	46	52	44	17	15	162	130
Redruth . .	296	231	126	133	36	43	34	41	11	12	55	42
Alston . .	430	288	67	68	12	19	20	26	18	19	24	29
Reeth . .	352	285	42	43	13	27	23	31	24	22	107	59
Carnarvon .	232	247	117	112	17	22	39	33	20	10	240	220
Liverpool .	278	268	93	104	167	195	46	44	16	15	99	85
Bristol . .	304	276	96	98	96	95	37	49	22	19	63	50
Hull . .	186	183	77	87	184	194	50	38	22	18	118	97
Birmingham .	293	268	95	106	102	100	50	56	22	19	72	59
Wolverhampton	235	235	107	118	133	133	53	53	22	22	94	87
Wolstanton .	271	285	79	90	72	72	37	40	20	19	128	107
Manchester .	259	263	98	107	111	109	46	49	14	11	130	107
Leeds . .	249	240	84	96	149	166	47	43	21	17	129	113
Macclesfield .	267	316	92	83	41	55	43	43	23	16	113	81
Leek . .	258	306	107	102	36	31	34	42	17	12	108	78

a This head comprises diseases of the respiratory organs and phthisis.
b Small-pox, measles, scarlatina, and hooping-cough.
c Diarrhœa, dysentery, and cholera.
d Scrofula and tabes mesenterica.
e Hydrocephalus, convulsions, and teething.

Explanation of Table LXXVIII.

In reading the table it is necessary to recollect that the figures do not afford a comparative view of the rate of mortality in different districts. Thus, 47 in each 1,000 male deaths in Glendale are produced by typhus and erysipelas; 46 are produced by the same diseases in each 1,000 male deaths in Liverpool; but as the inhabitants of Liverpool die in a much larger proportion than those of Glendale, the actual proportion of deaths from typhus and erysipelas to the number of the living is much larger in Liverpool than in Glendale; the actual death-rates from the two diseases being 74 per 100,000 of the male inhabitants of Glendale, and 179 per 100,000 of the male inhabitants of Liverpool. It is, however, interesting to observe, that typhus and erysipelas produce very nearly the same proportion of the total mortality in England and Wales; in several healthy districts, and in some of the unhealthiest towns in the kingdom. Thus although typhus often causes a larger proportion of deaths in unhealthy than in healthy places, it holds a subordinate position to several other causes of death in the production of a high death-rate. In England and Wales 47 in each 1,000 male deaths and 50 in each 1,000 female deaths are caused by typhus and erysipelas. The proportion is alike in both sexes in London, where 48 deaths in every 1,000 are referable to typhus and erysipelas. The proportions rise in the South Midland counties to 57 in each 1,000 male deaths and 65 in each 1,000 female deaths. They fall as low as 38 in each 1,000 male and 40 in each 1,000 female deaths in the Northern counties. The proportion falls between these extremes in most of the districts contained in the table.

Typhus and erysipelas.

The chief variations in the proportion of deaths produced by particular classes of disease in each 1,000 deaths from all causes are observed in pulmonary affections, contagious diseases, alvine flux, and the nervous diseases of children. Contagious diseases are doubtless fatal to a larger proportion of the inhabitants of great cities, because, on the one hand the proximity of persons favours the propagation of such diseases by contagion, and, on the other hand, measles and probably hooping cough prove more fatal among a population already predisposed to suffer from pulmonary disease. Eighty-eight in every 1,000 male deaths and ninety-two in every 1,000 female deaths in England and Wales are referable to the group of contagious diseases. This average is considerably exceeded in London, the North Western counties, and Yorkshire, where in 1,000 deaths of either sex the proportions produced by these diseases are, London, male 106, female 110; the North Western counties, male 104, female 110; Yorkshire, male 92, female 100. The proportion is considerably under the average in the South Eastern and the South Midland counties, where the proportion in each 1,000 deaths of either sex produced by these diseases are, South Eastern counties, male 66, female 70; South Midland counties, male 67, female 68. The proportion in the several registration districts shown in the table varies from 28 in every 1,000 male deaths, and 31 in every 1,000

Contagious diseases.

female deaths, in Haltwhistle, to 132 in every 1,000 male and 131 in every 1,000 female deaths in Easington. Haltwhistle is, however, a small district as regards population, and Easington, for reasons already assigned, is rather an exceptional district. If the proportion of the entire mortality that is produced by the four contagious diseases, in several large towns, as Liverpool, Manchester, Leeds, Birmingham, Bristol, and Hull, be compared with the proportion in England and Wales or in the Registration Divisions in which these towns are situated, or in rural Registration Districts, it will be observed that the proportion of the general mortality caused by these diseases is occasionally smaller, and rarely much larger, in unhealthy towns than in rural and healthier places. Bearing in remembrance the observations already made respecting the proportion of the total mortality in certain places produced by fever and erysipelas, which are equally applicable to these diseases, this fact at least shows, that, although, in common with several other forms of disease, they contribute to the production, contagious diseases are not the principal cause of high death-rates.

Pulmonary affections.

Out of every thousand male deaths in England and Wales, 409 are produced by the three groups of disease that throughout this paper have been called pulmonary affections, alvine flux, and the nervous diseases of children; 392 in each thousand female deaths are referable to the same causes. The proportion falls in Towcester and Glendale to 316 male and 360 female deaths in each 1,000 deaths of either sex in the former, and 204 male and 203 female deaths in the latter district. The proportions rise in London to 459 male and 427 female deaths in each 1,000 deaths of either sex respectively; in Birmingham, to 467 male and 427 female deaths; in Manchester, to 500 male and 479 female deaths; and in Liverpool, to 544 male and 548 female deaths in each 1,000 deaths of either sex respectively in each place.

In Glendale and Easington less than one male death in seven is caused by pulmonary disease; in Hull and Houghton-le-Spring less than one male death in five; in Leeds one male death in four is referable to the same cause. In Birmingham rather more and in Liverpool a little less than two in every seven male deaths, and in Alston very nearly half of all the male deaths, are produced by pulmonary diseases. Twenty-two in every thousand deaths of both sexes in England and Wales during the septennial period were caused by the three diseases, diarrhœa, dysentery, and cholera. In London, the proportion of the general mortality produced by the three profluvial diseases was much larger, 107 males and 114 females in every 1,000 deaths of either sex having perished from this class of diseases. Of the twenty registration districts contained in the table, Hull and Liverpool have had the largest proportion, and exclusive of districts of small population, Macclesfield, Houghton-le-Spring, Redruth, Leek, and Carnarvon, have had the smallest proportion of their entire mortality produced by the several forms of alvine flux. The proportion in

Diarrhœa, dysentery, and cholera.

Nervous diseases of children.

each 1,000 male deaths caused by the nervous diseases of children varies from 27 in Glendale to 240 in Carnarvon. These diseases are the cause of 97 male deaths and of 78 female deaths in each 1,000 deaths of either sex in England and Wales. The proportion considerably exceeds the general average in Monmouthshire and Wales, in the North Western counties, the North Midland counties, and in Yorkshire; it falls a good deal below the general average in the South Midland counties, the South Western counties, and the Eastern counties. More than twice as many deaths in each 1,000 deaths from all causes are produced by the nervous diseases of children in Monmouthshire and Wales, the North Western counties, the North Midland counties, and Yorkshire, as in the South Western counties and the Eastern counties.

The chief causes of high death-rates.

Pulmonary affections, alvine flux, and the nervous diseases of children are therefore the classes of disease which are both absolutely and relatively the chief causes of high death-rates. It is to the investigation of their origin that sanitary inquiries may most advantageously be directed. It is from devising and adopting measures for the removal of their causes that we may most confidently hope for an amelioration in the public health. Any measures that should be successfully adopted for diminishing the mortality produced by these diseases would undoubtedly diminish that from other diseases likewise. Certain of the contagious diseases, although their amount might be undiminished, would at least fall with diminished intensity upon a healthier population; and the same would probably hold true of other diseases likewise.

Causes which produce the prevalent diseases of unhealthy places require further investigation.

It would be foreign to the intention of this paper to attempt any accurate description of the causes which increase the mortality produced by those diseases which are found to add most largely to the death-rolls of unhealthy places. In truth the precise nature of these causes is still a subject for investigation. It may, however, be asserted that they are multifarious; and that, whilst an impure atmosphere, whether the impurity arise from the defective removal of refuse and excrete matters, from the overcrowding of dwellings, or from manufacturing processes, is among the most powerful, there are many other causes of disease to which attention has hitherto been too little directed. Insufficient or unsuitable food, sedentary habits, the absence of the physical and mental stimulus afforded by variety of scene and especially by rural prospects, the weariness caused by the monotonous character of many occupations, and, not least, the cares and anxieties of life, are all of them causes which help to swell the catalogue of illness, and to add to the register of deaths in great cities. Some of these causes of preventable sickness and premature death arise necessarily from the circumstances of our social system, and are but little, if at all, under the control of the executive government. Notwithstanding their exclusion from the catalogue of removable causes of unhealthfulss, there would yet remain ample scope for the employment of hygienic measures. In the first place, however, and before sanitary science can make much further progress, it would be necessary to investigate the causes of excessive disease and mortality in a more analytical manner than has heretofore been done, for without a more precise and accurate acquaintance with their causes it would be impossible to employ the most certain means of prevention against the diseases which so largely aggravate the death-rates of certain districts.

Influence of occupation on health evidently proved by this investigation.

One of the most evident facts brought to light by the present investigation is the influence of occupation on health. This influence is either direct, as in the case of the cutlers of Sheffield, the lead miners of Alston, the lace makers of Towcester and Bedford, or the silk manufacturers of Macclesfield; or it is indirect, as where the employment of women in factories seems to aggravate the infantile mortality, and particularly that produced by the nervous diseases of childhood. It is probable that a careful examination into the nature of these employments, and the manner in which their hurtful results are produced, would show that such results are not the inevitable consequences of the several industrial occupations. Means may perhaps be devised whereby the inhalation of the dust and grit produced in certain operations, and of the flue given off in other processes, might be avoided. The labourers employed in the discharge of vessels freighted with guano contrive to avoid inhaling the irritating particles of dust with which the atmosphere they habitually breathe whilst at work is impregnated, by the use of a roughly made but perfect extemporaneous respirator, formed of a piece of oakum tied up in sail cloth. Already there is a great difference in the comparative amount of impurity in the atmosphere of different factories where the same processes are conducted. Doubtless the skill of engineers and machine makers would enable them to invent still further improvements for the purpose of withdrawing mechanical particles from the air of work places, if their necessity was insisted upon, and perhaps better ventilation and a lower temperature of working rooms might be found not incompatible with the successful prosecution of processes of manufacture. At Messrs. Copeland's pottery at Stoke, a new invention has been introduced which promises to remove one fertile source of bronchitis among the operatives.*

Use of respirator by guano labourers.

It may be more difficult to deal with the other branch of this question. The withdrawal of children from their mother's care, and the consequent substitution of artificial feeding for the natural diet of infancy, which is probably one at least among the causes of a large infantile mortality in places where the female population are largely engaged in factory labour, is possibly an evil inherent in the modern factory system. Whether it can be met without an undue interference with the rights of labour is a question the consideration of which forms no part of my present duty.

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* A considerable share of the pulmonary mortality in pottery districts occurs among men who work at the *slip-kilns*, and are consequently exposed to alternations of the external air with the hot moist air in which the evaporation of *slip* (the pappy mixture of clay and flint) goes on at a high temperature. The process which is now in use at Mr. Copeland's pottery consists simply in the application of hydraulic pressure (instead of heat) as the agent for converting *slip* into *dough* :—the slip is let flow into sacks of thick web, which being then exposed to pressure sweat out the water of their contents, and retain only the doughy residue.

Another share of the pulmonary mortality of potteries depends on inhalation of the dust which is engendered in rubbing *biscuit*. Is there any reason why *moist-rubbing* should not be substituted for *dry-rubbing* in this stage of the manufacture?

Concluding remarks.

If throughout this paper I have dwelt rather exclusively upon the apparent effect of occupation upon the death-rates, this has not arisen from any doubt as to the great benefit to be derived from ordinary measures of town improvement, and from the other expedients which have been so earnestly recommended in the hope of lessening the excessive amount of sickness and mortality in crowded urban districts. From personal experience, I am thoroughly convinced of the advantages derivable from such exertions, which, if they fail to accomplish all that is sometimes expected from them, will yet most certainly produce an incalculable amount of good. But I have considered it best to direct my attention to circumstances equally important, which have hitherto received too little attention from sanitary inquirers, and which, if overlooked, will assuredly neutralise some of the advantages which would accrue from otherwise well-directed although it may be imperfect sanitary precautions.

E. HEADLAM GREENHOW.

77, *Upper Berkeley Street,*
May 1858.

APPENDIX.

No. I.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several Registration Divisions of England and Wales during the Period 1848–54.

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	ENGLAND AND WALES.		1. London.		2. South Eastern Counties.	
	Population in 1851 – 17,927,609 No. of Persons per Square Mile – – 307 No. of Persons per Cent. in Towns – 50		Population in 1851 – 2,362,236 No. of Persons per Square Mile – – – 19,375 No. of Persons per Cent. in Towns – 100		Population in 1851 – 1,628,386 No. of Persons per Square Mile – – – 256 No. of Persons per Cent. in Towns – 44	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
All Causes	2,367	2,209	2,740	2,353	2,071	1,960
Diseases of the Respiratory Organs * and Phthisis	569	535	758	593	498	475
Small-pox	31	27	40	31	23	18
Measles	40	38	50	42	21	20
Scarlatina	94	87	117	96	62	60
Hooping-cough	44	53	85	90	32	41
Croup	24	20	17	13	16	13
Diarrhœa	89	81	117	100	71	66
Dysentery	14	13	11	8	10	7
Cholera	67	66	166	160	48	44
Influenza	13	14	8	10	15	15
Ague	1·1	0·9	1·2	0·8	2·0	1·2
Typhus	100	99	113	98	98	100
Erysipelas	12	12	19	16	12	12
Scrofula	16	13	17	13	15	14
Tabes Mesenterica	28	24	44	33	27	25
Hydrocephalus	50	37	79	52	44	33
Apoplexy	46	44	58	54	56	57
Paralysis	42	44	50	47	44	47
Convulsions	154	115	102	71	98	73
Teething	27	22	28	21	20	16
Carbuncle and Phlegmon	4	2·5	4	2·0	4	2·3
Rheumatism and Rheumatic Fever	10	9	13	11	10	9

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	3. South Midland Counties.		4. Eastern Counties.		5. South Western Counties.	
	Population in 1851 – 1,234,332 No. of Persons per Square Mile – – – 247 No. of Persons per Cent. in Towns – – 28		Population in 1851 – 1,113,982 No. of Persons per Square Mile – – – 222 No. of Persons per Cent. in Towns – – 31		Population in 1851 – 1,803,291 No. of Persons per Square Mile – – – 231 No. of Persons per Cent. in Towns – – 36	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
All Causes	2,135	2,075	2,094	2,024	2,103	1,965
Diseases of the Respiratory Organs * and Phthisis	477	485	489	516	509	459
Small-pox	22	18	16	14	38	32
Measles	28	27	21	19	26	23
Scarlatina	60	57	77	74	78	69
Hooping-cough	33	41	33	39	37	42
Croup	18	15	13	12	21	17
Diarrhœa	74	67	70	60	46	41
Dysentery	6	6	5	4	8	8
Cholera	39	37	29	24	43	40
Influenza	19	20	13	13	19	21
Ague	1·7	1·6	2·0	1·8	0·6	0·5
Typhus	110	124	100	98	89	95
Erysipelas	13	12	11	10	10	9
Scrofula	17	13	18	18	15	13
Tabes Mesenterica	26	24	32	28	22	18
Hydrocephalus	36	27	32	22	35	26
Apoplexy	46	48	43	46	52	51
Paralysis	43	49	42	49	44	49
Convulsions	94	69	69	53	77	56
Teething	17	16	15	13	15	11
Carbuncle and Phlegmon	6	3·8	6	3·2	4	2·4
Rheumatism and Rheumatic Fever	10	8	9	8	9	7

* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. I.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several Registration Divisions of England and Wales during the Period 1848-54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	6. West Midland Counties.		7. North Midland Counties.		8. North Western Counties.	
	Population in 1851 – 2,132,930 No. of Persons per Square Mile – – – 355 No. of Persons per Cent. in Towns – – 51		Population in 1851 – 1,214,538 No. of Persons per Square Mile – – – 220 No. of Persons per Cent. in Towns – – 30		Population in 1851 – 2,490,827 No. of Persons per Square Mile – – – 792 No. of Persons per Cent. in Towns – – 63	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
All Causes	2,396	2,241	2,118	2,081	2,795	2,572
Diseases of the Respiratory Organs* and Phthisis	586	547	465	500	694	674
Small-pox	35	30	25	23	28	25
Measles	47	44	33	32	67	63
Scarlatina	89	86	83	81	141	127
Hooping-cough	32	41	33	40	56	68
Croup	22	19	23	18	42	35
Diarrhœa	108	97	66	61	149	136
Dysentery	12	11	8	8	30	27
Cholera	45	42	15	13	67	70
Influenza	15	15	21	22	8	8
Ague	0·5	0·2	1·1	1·3	0·9	0·9
Typhus	97	102	84	91	110	106
Erysipelas	12	12	11	12	13	12
Scrofula	15	13	14	12	17	10
Tabes Mesenterica	30	27	18	17	28	23
Hydrocephalus	39	28	35	28	70	50
Apoplexy	46	44	37	36	40	36
Paralysis	41	43	38	40	38	39
Convulsions	132	102	214	158	238	179
Teething	21	18	25	21	52	45
Carbuncle and Phlegmon	5	2·7	4	2·7	4	2·4
Rheumatism and Rheumatic Fever	11	9	9	9	11	11

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	9. Yorkshire.		10. Northern Counties.		11. Monmouthshire and Wales.	
	Population in 1851 – 1,789,047 No. of Persons per Square Mile – – – 313 No. of Persons per Cent. in Towns – – 45		Population in 1851 – 969,126 No. of Persons per Square Mile – – – 178 No. of Persons per Cent. in Towns – – 44		Population in 1851 – 1,188,914 No. of Persons per Square Mile – – – 146 No. of Persons per Cent. in Towns – – 29	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
All Causes	2,444	2,321	2,299	2,187	2,222	2,100
Diseases of the Respiratory Organs* and Phthisis	535	523	469	457	526	491
Small-pox	36	33	36	31	36	33
Measles	51	50	41	39	25	26
Scarlatina	99	102	88	82	90	89
Hooping-cough	39	48	40	50	40	49
Croup	27	23	26	23	35	32
Diarrhœa	93	89	71	68	38	35
Dysentery	26	28	10	8	8	7
Cholera	64	62	100	107	71	65
Influenza	10	11	12	14	12	13
Ague	0·7	0·6	1·7	1·9	0·4	0·5
Typhus	92	89	77	77	115	107
Erysipelas	11	12	11	11	6	5
Scrofula	14	10	14	10	23	16
Tabes Mesenterica	23	19	38	34	14	14
Hydrocephalus	65	53	63	51	19	13
Apoplexy	48	43	38	35	25	23
Paralysis	34	35	42	47	39	41
Convulsions	259	194	122	94	248	203
Teething	39	34	26	24	12	11
Carbuncle and Phlegmon	4	2·2	4	3·1	2	1·5
Rheumatism and Rheumatic Fever	10	10	8	8	10	11

* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. II.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Counties during the Period 1848–54.

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	Hertfordshire.		Buckinghamshire.		Northamptonshire.	
	Population in 1851 - 173,962 No. of Persons per Square Mile - - - 200 No. of Persons per Cent. in Towns - 24		Population in 1851 - 143,655 No. of Persons per Square Mile - - - 228 No. of Persons per Cent. in Towns - 37		Population in 1851 - 213,814 No. of Persons per Square Mile - - - 216 No. of Persons per Cent. in Towns - 28	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
All Causes	1,995	1,890	2,102	2,169	2,141	2,174
Diseases of the Respiratory Organs* and Phthisis	474	452	472	512	440	468
Small-pox	23	17	14	11	20	17
Measles	32	27	26	23	37	33
Scarlatina	50	48	56	53	74	67
Hooping-cough	23	33	34	39	36	49
Croup	16	14	17	12	21	20
Diarrhœa	62	57	76	68	61	51
Dysentery	6	5	7	7	6	6
Cholera	42	36	36	31	22	23
Influenza	11	12	25	27	31	29
Ague	0·7	0·7	0·8	0·6	1·6	1·3
Typhus	102	112	110	129	106	131
Erysipelas	12	9	15	12	13	11
Scrofula	14	11	18	16	16	12
Tabes Mesenterica	18	17	31	30	21	21
Hydrocephalus	28	18	37	27	31	30
Apoplexy	54	53	42	50	41	38
Paralysis	32	45	42	54	47	58
Convulsions	130	97	72	49	121	94
Teething	13	15	12	14	23	20
Carbuncle and Phlegmon	5	2·5	8	3·3	8	5·7
Rheumatism and Rheumatic Fever	12	7	8	8	7	8

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	Bedfordshire.		Cambridgeshire.		Cornwall.	
	Population in 1851 - 129,805 No. of Persons per Square Mile - - - 272 No. of Persons per Cent. in Towns - 30		Population in 1851 - 191,894 No. of Persons per Square Mile - - - 215 No. of Persons per Cent. in Towns - 31		Population in 1851 - 356,641 No. of Persons per Square Mile - - - 259 No. of Persons per Cent. in Towns - 22	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
All Causes	2,096	2,065	2,181	2,097	2,070	1,915
Diseases of the Respiratory Organs* and Phthisis	480	548	495	499	533	432
Small-pox	24	19	28	27	53	43
Measles	25	22	31	33	32	29
Scarlatina	45	38	67	65	75	69
Hooping-cough	39	48	37	44	48	54
Croup	16	11	19	17	23	21
Diarrhœa	85	78	82	66	38	32
Dysentery	7	5	4	4	15	16
Cholera	21	24	52	51	38	38
Influenza	29	25	12	11	16	18
Ague	0·7	0·4	3·1	3·6	0·5	0·2
Typhus	122	153	118	119	69	71
Erysipelas	13	17	12	10	7	7
Scrofula	17	11	22	16	11	8
Tabes Mesenterica	29	23	28	25	18	15
Hydrocephalus	30	22	33	24	31	25
Apoplexy	40	49	40	42	37	40
Paralysis	54	50	26	34	45	52
Convulsions	114	75	73	57	65	47
Teething	7	11	25	21	10	7
Carbuncle and Phlegmon	3	3·4	5	3·9	5	3·3
Rheumatism and Rheumatic Fever	7	9	10	5	8	6

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. II.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION COUNTIES during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	GLOUCESTERSHIRE.		HEREFORDSHIRE.		STAFFORDSHIRE.	
	Population in 1851 - 419,514 No. of Persons per Square Mile - - - 375 No. of Persons per Cent. in Towns - - 55		Population in 1851 - 99,120 No. of Persons per Square Mile - - - 149 No. of Persons per Cent. in Towns - - 25		Population in 1851 - 630,545 No. of Persons per Square Mile - - - 534 No. of Persons per Cent. in Towns - - 55	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
ALL CAUSES	2,346	2,127	2,060	1,941	2,619	2,477
Diseases of the Respiratory Organs* and Phthisis	616	542	444	426	606	591
Small-pox	33	25	14	10	44	41
Measles	27	22	18	15	79	78
Scarlatina	84	75	39	45	113	114
Hooping-cough	32	39	16	22	38	48
Croup	13	9	17	16	31	29
Diarrhœa	89	71	28	24	128	124
Dysentery	8	6	4	3	10	9
Cholera	63	60	2	2	75	72
Influenza	19	20	19	16	12	12
Ague	0·4	0·1	0·3	0·	0·6	0·2
Typhus	86	91	59	55	113	116
Erysipelas	11	11	9	6	12	12
Scrofula	17	18	16	11	15	12
Tabes Mesenterica	31	26	8	9	38	36
Hydrocephalus	37	26	17	15	41	30
Apoplexy	68	45	49	48	39	38
Paralysis	78	53	56	43	30	33
Convulsions	91	67	84	71	195	161
Teething	14	11	9	9	34	30
Carbuncle and Phlegmon	3	2·2	4	2·0	7	3·3
Rheumatism and Rheumatic Fever	9	8	11	10	12	9

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	WORCESTERSHIRE.		WARWICKSHIRE.		LEICESTERSHIRE.	
	Population in 1851 - 258,733 No. of Persons per Square Mile - - - 381 No. of Persons per Cent. in Towns - - 32		Population in 1851 - 480,120 No. of Persons per Square Mile - - - 501 No. of Persons per Cent. in Towns - - 65		Population in 1851 - 234,957 No. of Persons per Square Mile - - - 283 No. of Persons per Cent. in Towns - - 39	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
ALL CAUSES	2,163	2,011	2,472	2,328	2,219	2,169
Diseases of the Respiratory Organs* and Phthisis	511	486	650	583	535	542
Small-pox	24	24	42	35	21	19
Measles	31	28	45	44	45	44
Scarlatina	66	66	92	86	64	60
Hooping-cough	23	24	38	48	34	42
Croup	22	19	19	16	24	18
Diarrhœa	76	66	169	151	90	80
Dysentery	8	7	26	23	11	6
Cholera	32	31	18	14	8	4
Influenza	16	14	17	17	17	19
Ague	1·0	0·1	0·5	0·2	0·1	0·
Typhus	83	92	112	120	89	113
Erysipelas	11	10	15	15	11	14
Scrofula	12	10	16	13	13	12
Tabes Mesenterica	18	18	37	29	28	21
Hydrocephalus	32	26	49	34	32	26
Apoplexy	55	44	49	49	38	39
Paralysis	45	43	41	46	41	42
Convulsions	100	67	102	81	190	141
Teething	16	14	19	17	20	18
Carbuncle and Phlegmon	4	2·3	4	2·5	5	3·1
Rheumatism and Rheumatic Fever	11	9	12	9	8	9

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. II.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION COUNTIES during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	LINCOLNSHIRE.		NOTTINGHAMSHIRE.		CHESHIRE.	
	Population in 1851 - 400,236 No. of Persons per Square Mile - - - 147 No. of Persons per Cent. in Towns - - 26		Population in 1851 - 294,380 No. of Persons per Square Mile - - - 314 No. of Persons per Cent. in Towns - - 32		Population in 1851 - 423,526 No. of Persons per Square Mile - - - 391 No. of Persons per Cent. in Towns - - 48	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
ALL CAUSES	1,945	1,927	2,227	2,161	2,392	2,267
Diseases of the Respiratory Organs* and Phthisis	367	401	488	549	558	593
Small-pox	11	10	35	34	34	33
Measles	26	25	35	35	43	40
Scarlatina	92	93	85	85	127	109
Hooping-cough	31	39	34	41	38	48
Croup	19	17	19	14	29	27
Diarrhœa	54	51	82	74	101	91
Dysentery	5	7	12	9	28	28
Cholera	23	21	16	17	35	28
Influenza	18	21	19	20	12	11
Ague	1·8	2·6	0·6	1·0	0·8	0·9
Typhus	77	80	90	98	84	84
Erysipelas	12	10	10	12	11	10
Scrofula	13	11	15	12	18	11
Tabes Mesenterica	11	14	20	20	29	22
Hydrocephalus	26	23	37	30	55	37
Apoplexy	36	31	37	34	41	37
Paralysis	35	37	40	39	40	45
Convulsions	198	155	238	169	210	158
Teething	27	22	27	21	33	30
Carbuncle and Phlegmon	3	2·5	4	2·3	3	2·4
Rheumatism and Rheumatic Fever	7	6	11	10	12	11

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	LANCASHIRE.		WEST RIDING.		DURHAM.	
	Population in 1851 - 2,067,301 No. of Persons per Square Mile - - - 1,003 No. of Persons per Cent. in Towns - - 66		Population in 1851 - 1,340,051 No. of Persons per Square Mile - - - 508 No. of Persons per Cent. in Towns - - 46		Population in 1851 - 411,679 No. of Persons per Square Mile - - - 349 No. of Persons per Cent. in Towns - - 42	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
ALL CAUSES	2,877	2,634	2,516	2,388	2,400	2,298
Diseases of the Respiratory Organs* and Phthisis	722	690	577	556	478	477
Small-pox	27	24	40	38	48	45
Measles	72	67	58	57	51	51
Scarlatina	144	130	104	106	100	95
Hooping-cough	59	72	42	52	42	55
Croup	45	37	28	24	26	21
Diarrhœa	159	145	98	94	84	83
Dysentery	30	27	28	30	13	15
Cholera	73	79	57	55	105	110
Influenza	8	8	8	9	10	12
Ague	0·9	0·9	0·8	0·7	2·2	2·4
Typhus	116	110	92	93	84	87
Erysipelas	13	13	10	12	9	9
Scrofula	17	10	14	10	14	11
Tabes Mesenterica	28	23	23	19	46	44
Hydrocephalus	73	53	72	59	73	65
Apoplexy	40	36	48	43	35	32
Paralysis	37	38	33	32	35	37
Convulsions	244	184	270	203	164	129
Teething	56	48	43	38	33	30
Carbuncle and Phlegmon	4	2·4	4	2·5	3	3·4
Rheumatism and Rheumatic Fever	11	11	10	11	8	7

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. II.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Counties during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	NORTHUMBERLAND.		CUMBERLAND.		MONMOUTHSHIRE.	
	Population in 1851 – 303,568 No. of Persons per Square Mile – – – 154 No. of Persons per Cent. in Towns – – 49		Population in 1851 – – 195,492 No. of Persons per Square Mile – – – 125 No. of Persons per Cent. in Towns – – 43		Population in 1851 – 177,130 No. of Persons per Square Mile – – – 262 No. of Persons per Cent. in Towns – – 28	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
ALL CAUSES	2,371	2,201	2,095	2,027	2,398	2,214
Diseases of the Respiratory Organs* and Phthisis	486	452	436	434	587	554
Small-pox	29	24	29	22	37	37
Measles	33	30	40	37	33	35
Scarlatina	84	76	73	62	86	102
Hooping-cough	42	50	37	45	44	56
Croup	26	21	26	26	22	17
Diarrhœa	71	66	57	53	54	52
Dysentery	8	8	8	11	17	14
Cholera	150	163	38	45	77	55
Influenza	9	10	14	19	12	11
Ague	1·9	2·0	0·6	0·6	1·1	0·8
Typhus	83	76	60	65	143	132
Erysipelas	14	13	14	12	9	8
Scrofula	14	8	14	9	20	12
Tabes Mesenterica	40	34	24	19	28	33
Hydrocephalus	60	43	47	36	31	24
Apoplexy	43	39	37	34	35	24
Paralysis	56	60	41	49	29	26
Convulsions	108	88	56	37	251	210
Teething	26	24	16	15	15	16
Carbuncle and Phlegmon	5	3·7	5	2·0	1	1·9
Rheumatism and Rheumatic Fever	7	7	10	11	10	10

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	SOUTH WALES.		NORTH WALES.	
	Population in 1851 – 607,456 No. of Persons per Square Mile – – – 138 No. of Persons per Cent. in Towns – – 34		Population in 1851 – 404,328 No. of Persons per Square Mile – – – 131 No. of Persons per Cent. in Towns – 22	
	DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
ALL CAUSES	2,284	2,127	2,048	2,012
Diseases of the Respiratory Organs* and Phthisis	543	491	471	466
Small-pox	39	37	30	25
Measles	25	25	21	22
Scarlatina	80	75	107	104
Hooping-cough	39	47	39	48
Croup	45	42	26	23
Diarrhœa	43	40	21	19
Dysentery	9	8	3	4
Cholera	110	103	12	11
Influenza	10	11	15	18
Ague	0·3	0·5	0·2	0·3
Typhus	123	112	89	87
Erysipelas	6	5	5	5
Scrofula	26	18	21	14
Tabes Mesenterica	16	15	5	4
Hydrocephalus	17	11	15	12
Apoplexy	23	22	23	23
Paralysis	34	35	51	51
Convulsions	206	168	310	253
Teething	14	12	7	6
Carbuncle and Phlegmon	2	2·0	1	·6
Rheumatism and Rheumatic Fever	10	11	11	11

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. III.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION DISTRICTS during the Period 1848–54.

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	ABERGAVENNY.		ABERYSTWITH.		ALCESTER.	
	Population in 1851 – 59,229 No. of Persons per Square Mile – – – 430 No. of Persons per Cent. in Towns – – 22 No. of Paupers per 1,000 Persons – – 18 Industry.—Mining and Iron Manufacture.		Population in 1851 – 23,753 No. of Persons per Square Mile – – – 115 No. of Persons per Cent. in Towns – – 22 No. of Paupers per 1,000 Persons – – 44 Industry.—Lead Mining.		Population in 1851 – 17,482 No. of Persons per Square Mile – – – 213 No. of Persons per Cent. in Towns – – 11 No. of Paupers per 1,000 Persons – – 58 Industry.—Needle Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	431	333	89	80	313	262
Small-pox	40	45	33	32	29	34
Measles	35	52	15	6	26	11
Scarlatina	99	112	68	50	23	25
Hooping-cough	47	70	106	88	33	34
Croup	23	18	68	59	29	16
Diarrhœa	79	85	4	3	77	62
Dysentery	11	6	0	1	10	2
Cholera	132	87	0	1	10	5
Influenza	5	8	23	21	34	23
Ague	0	1	0	0	0	0
Typhus	217	201	77	75	77	75
Rheumatic Fever	2	3	5	1	2	5
Erysipelas	9	7	1	1	10	7
Scrofula	22	16	21	22	16	13
Tabes Mesenterica	56	72	6	11	15	3
Phthisis	231	268	402	349	246	315
Hydrocephalus	54	37	9	10	28	20
Apoplexy	36	21	23	16	39	46
Paralysis	23	21	29	46	65	31
Convulsions	276	241	136	92	70	41
Bronchitis	186	153	9	7	42	44
Pneumonia	199	154	23	21	209	175
Teething	25	23	5	5	8	15
Rheumatism	10	8	11	10	7	13
Carbuncle	1	0	1	0	0	0
Phlegmon	0	1	3	0	0	5

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	ALSTON.		ASTON.		BASFORD.	
	Population in 1851 – 6,816 No. of Persons per Square Mile – – – 125 No. of Persons per Cent. in Towns – – 29 No. of Paupers per 1,000 Persons – – 44 Industry.—Lead Mining.		Population in 1851 – 66,852 No. of Persons per Square Mile – – – 1,368 No. of Persons per Cent. in Towns – – 74 No. of Paupers per 1,000 Persons – – 10 Industry.—Hardware Manufacture.		Population in 1851 – 64,923 No. of Persons per Square Mile – – – 472 No. of Persons per Cent. in Towns – – 0 No. of Paupers per 1,000 Persons – – 42 Industry.—Hosiery.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	482	173	389	335	256	221
Small-pox	12	0	39	30	46	47
Measles	33	30	52	46	31	37
Scarlatina	67	42	111	103	73	74
Hooping-cough	25	46	48	60	26	38
Croup	17	21	23	23	28	20
Diarrhœa	17	30	186	170	59	61
Dysentery	0	4	31	22	12	5
Cholera	8	0	13	11	22	27
Influenza	21	25	6	8	16	15
Ague	0	0	0	0	2	4
Typhus	29	38	88	101	83	102
Rheumatic Fever	0	13	3	2	4	3
Erysipelas	12	8	13	15	9	12
Scrofula	12	17	10	11	17	10
Tabes Mesenterica	25	17	38	24	13	12
Phthisis	395	321	244	204	252	356
Hydrocephalus	33	25	72	41	30	31
Apoplexy	12	17	48	44	32	20
Paralysis	37	101	36	42	37	27
Convulsions	8	4	92	78	266	179
Bronchitis	79	13	143	146	38	45
Pneumonia	137	144	205	158	174	137
Teething	8	21	16	16	27	23
Rheumatism	21	25	9	5	5	6
Carbuncle	0	0	3	0	0	0
Phlegmon	0	0	1	1	2	4

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. III.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Districts during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	BEDFORD.		BELPER.		BERKHAMPSTEAD.	
	Population in 1851 - 35,523 No. of Persons per Square Mile - - - 234 No. of Persons per Cent. in Towns - - 33 No. of Paupers per 1,000 Persons - - 61 Industry.—Agriculture, lace.		Population in 1851 - 46,872 No. of Persons per Square Mile - - - 450 No. of Persons per Cent. in Towns - - 27 No. of Paupers per 1,000 Persons - - 27 Industry.—Agriculture, Hose, Mining.		Population in 1851 - 12,527 No. of Persons per Square Mile - - - 326 No. of Persons per Cent. in Towns - - 49 No. of Paupers per 1,000 Persons - - 49 Industry.—Agriculture, Straw Plait.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	199	175	229	188	279	236
Small-pox	9	4	50	57	7	7
Measles	22	20	23	20	60	81
Scarlatina	32	30	67	64	119	118
Hooping-cough	49	66	27	32	45	31
Croup	17	14	37	33	21	20
Diarrhœa	69	73	45	41	110	103
Dysentery	6	5	2	6	10	0
Cholera	17	22	2	7	38	20
Influenza	53	41	37	36	10	11
Ague	0	0	1	2	0	0
Typhus	106	127	95	86	126	105
Rheumatic Fever	1	2	2	1	2	2
Erysipelas	12	11	9	10	14	7
Scrofula	17	9	18	13	19	11
Tabes Mesenterica	28	19	18	23	19	7
Phthisis	220	352	239	370	212	330
Hydrocephalus	26	24	46	34	60	17
Apoplexy	36	57	31	27	55	44
Paralysis	56	50	46	48	57	70
Convulsions	105	61	221	150	105	72
Bronchitis	57	60	48	43	88	81
Pneumonia	110	74	105	84	126	105
Teething	0	7	23	31	17	33
Rheumatism	4	7	5	9	12	0
Carbuncle	0	1	0	0	2	2
Phlegmon	0	1	4	1	2	0

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	BIDEFORD.		BIRMINGHAM.		BLACKBURN.	
	Population in 1851 - 19,607 No. of Persons per Square Mile - - - 171 No. of Persons per Cent. in Towns - - 29 No. of Paupers per 1,000 Persons - - 68 Industry.—Agriculture.		Population in 1851 - 173,951 No. of Persons per Square Mile - - - 41,853 No. of Persons per Cent. in Towns - - 100 No. of Paupers per 1,000 Persons† - - 35 Industry.—Hardware Manufacture.		Population in 1851 - 90,738 No. of Persons per Square Mile - - - 1,333 No. of Persons per Cent. in Towns - - 58 No. of Paupers per 1,000 Persons - - 38 Industry.—Cotton Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	243	178	511	430	360	320
Small-pox	11	4	39	36	23	26
Measles	19	25	60	63	79	80
Scarlatina	88	72	119	108	105	104
Hooping-cough	29	28	55	69	60	70
Croup	17	19	22	20	48	47
Diarrhœa	17	14	253	225	114	100
Dysentery	5	3	28	30	11	13
Cholera	48	26	10	6	18	15
Influenza	19	23	9	11	13	18
Ague	2	0	1	0	1	2
Typhus	74	81	126	131	169	160
Rheumatic Fever	2	1	2	2	5	3
Erysipelas	6	10	18	16	10	9
Scrofula	8	8	17	12	21	11
Tabes Mesenterica	8	10	47	39	63	49
Phthisis	172	175	327	269	348	414
Hydrocephalus	45	34	69	44	51	34
Apoplexy	65	84	56	56	37	31
Paralysis	20	30	35	42	35	36
Convulsions	43	34	115	96	228	164
Bronchitis	64	63	226	206	129	126
Pneumonia	135	69	221	181	182	154
Teething	8	6	21	16	77	66
Rheumatism	5	10	10	7	9	8
Carbuncle	2	1	1	0	1	0
Phlegmon	12	8	2	1	4	2

* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

† Average for six years only.

No. III.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION DISTRICTS during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	BLOFIELD.		BOOTLE.		BRADFORD (YORKSHIRE).	
	Population in 1851 - 11,574 No. of Persons per Square Mile - - - 168 No. of Persons per Cent. in Towns - - 0 No. of Paupers per 1,000 Persons - - - 68 Industry—Agriculture.		Population in 1851 - 6,008 No. of Persons per Square Mile - - - 38 No. of Persons per Cent. in Towns - - 0 No. of Paupers per 1,000 Persons - - - 27 Industry—Agriculture.		Population in 1851 - 181,964 No. of Persons per Square Mile - - - 2,887 No. of Persons per Cent. in Towns - - 57 No. of Paupers per 1,000 Persons - - - 20 Industry—Woollen Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	178	214	100	55	328	249
Small-pox	0	0	5	0	51	45
Measles	27	32	0	10	72	67
Scarlatina	84	69	41	30	116	123
Hooping-cough	20	27	18	30	55	66
Croup	0	10	18	10	28	25
Diarrhœa	42	47	14	5	121	124
Dysentery	5	20	0	0	47	53
Cholera	0	5	5	5	46	45
Influenza	17	22	32	45	3	2
Ague	2	0	0	0	1	1
Typhus	89	99	18	25	92	94
Rheumatic Fever	5	0	0	0	2	3
Erysipelas	10	12	18	25	8	11
Scrofula	10	17	0	0	15	11
Tabes Mesenterica	5	5	0	5	24	20
Phthisis	198	278	177	280	283	354
Hydrocephalus	32	17	14	25	84	69
Apoplexy	77	57	41	30	41	39
Paralysis	77	57	5	5	20	22
Convulsions	82	32	23	10	388	281
Bronchitis	84	81	18	10	89	70
Pneumonia	79	116	73	10	175	131
Teething	7	12	14	15	55	43
Rheumatism	5	2	0	0	4	7
Carbuncle	0	0	0	0	1	0
Phlegmon	5	2	9	10	3	3

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	BRISTOL.		BROMSGROVE.		BUILTH.	
	Population in 1851 - 65,716 Number of Persons per Square Mile - - - 22,858 No. of Persons per Cent. in Towns - - 100 No. of Paupers per 1,000 Persons† - - Industry—Commerce.		Population in 1851 - - 24,822 No. of Persons per Square Mile - - - 335 No. of Persons per Cent. in Towns - - 17 No. of Paupers per 1,000 Persons - - - 55 Industry—Hardware.		Population in 1851 - - 8,345 Number of Persons per Square Mile - - - 52 No. of Persons per Cent. in Towns - - 0 No. of Paupers per 1,000 Persons - - - 96 Industry—Agriculture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	555	430	308	251	96	133
Small-pox	80	63	32	40	7	3
Measles	48	34	43	30	0	3
Scarlatina	125	105	50	41	76	37
Hooping-cough	57	65	29	36	28	34
Croup	18	15	38	37	21	24
Diarrhœa	136	112	65	68	14	0
Dysentery	13	6	3	1	0	0
Cholera	160	140	18	9	3	0
Influenza	8	8	14	23	10	3
Ague	6	0	0	0	0	0
Typhus	102	115	81	98	90	102
Rheumatic Fever	3	2	5	1	14	7
Erysipelas	20	19	6	10	0	3
Scrofula	25	19	17	17	28	20
Tabes Mesenterica	49	34	9	8	0	0
Phthisis	424	312	275	308	299	283
Hydrocephalus	48	30	45	38	3	0
Apoplexy	64	61	44	45	10	7
Paralysis	52	55	32	33	76	61
Convulsions	128	88	75	56	90	44
Bronchitis	201	190	38	36	14	3
Pneumonia	254	179	205	177	24	27
Teething	29	19	5	6	3	0
Rheumatism	11	10	8	2	21	10
Carbuncle	1	0	1	0	0	0
Phlegmon	3	0	2	0	17	14

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia Asthma, and Diseases of the Lungs.
† No return.

No. III.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION DISTRICTS during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	CAERNARVON.		CHESTERFIELD.		CHORLTON.	
	Population in 1851 – 30,446 No. of Persons per Square Mile – – – 200 No. of Persons per Cent. in Towns – – 28 No. of Paupers per 1,000 Persons – – 83 Industry.—Slate Quarrying.		Population in 1851 – – 45,795 No. of Persons per Square Mile – – – 309 No. of Persons per Cent. in Towns – – 16 No. of Paupers per 1,000 Persons – – 28 Industry.—Mining, Iron Manufacture.		Population in 1851 † – 123,841 No. of Persons per Square Mile – – – 6,863 No. of Persons per Cent. in Towns – – 84 No. of Paupers per 1,000 Persons – – 19 Industry.—Cotton Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	164	149	201	170	393	325
Small-pox	63	38	36	26	18	14
Measles	15	26	38	32	66	53
Scarlatina	119	118	112	104	187	148
Hooping-cough	63	65	48	57	82	96
Croup	30	29	24	14	38	27
Diarrhœa	21	32	49	40	217	190
Dysentery	4	6	11	18	54	41
Cholera	16	11	4	4	36	41
Influenza	29	41	19	12	7	8
Ague	0	0	1	2	0	0
Typhus	81	72	83	94	90	80
Rheumatic Fever	4	9	4	3	4	3
Erysipelas	6	2	11	15	12	13
Scrofula	45	19	7	3	18	9
Tabes Mesenterica	1	5	7	6	27	21
Phthisis	350	398	255	332	335	321
Hydrocephalus	21	6	51	37	74	57
Apoplexy	16	21	25	31	36	38
Paralysis	60	63	24	29	30	35
Convulsions	501	468	320	21	186	139
Bronchitis	31	20	35	40	159	137
Pneumonia	48	37	128	105	180	146
Teething	11	14	23	28	35	31
Rheumatism	8	8	5	6	6	6
Carbuncle	0	1	2	0	2	1
Phlegmon	0	0	4	4	1	2

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	COVENTRY.		CRANBROOK.		DERBY.	
	Population in 1851 – 36,812 No. of Persons per Square Mile – – – 4,292 No. of Persons per Cent. in Towns – – 100 No. of Paupers per 1,000 Persons‡ Industry.—Ribbons and Watches.		Population in 1851 – 13,069 No. of Persons per Square Mile – – – 208 No. of Persons per Cent. in Towns – – 0 No. of Paupers per 1,000 Persons – – 92 Industry.—Agriculture.		Population in 1851 – 43,684 No. of Persons per Square Mile – – – 9,413 No. of Persons per Cent. in Towns – – 93 No. of Paupers per 1,000 Persons – – 9 Industry.—Silk and Iron Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	382	330	149	168	313	253
Small-pox	65	62	6	2	86	67
Measles	42	42	4	4	48	42
Scarlatina	115	120	65	66	63	46
Hooping-cough	28	34	41	35	37	33
Croup	15	10	13	15	60	17
Diarrhœa	303	251	41	35	95	87
Dysentery	80	56	9	11	7	8
Cholera	93	78	4	11	18	11
Influenza	6	10	9	15	15	19
Ague	2	0	0	0	3	0
Typhus	131	140	126	104	98	97
Rheumatic Fever	2	2	6	0	3	2
Erysipelas	20	20	9	7	19	16
Scrofula	14	13	13	24	25	14
Tabes Mesenterica	41	30	17	7	30	20
Phthisis	279	243	193	327	332	386
Hydrocephalus	40	22	37	40	68	69
Apoplexy	44	39	58	42	43	30
Paralysis	43	48	39	42	38	38
Convulsions	115	83	82	51	281	174
Bronchitis	164	155	45	57	50	57
Pneumonia	169	134	82	77	165	122
Teething	33	32	4	15	30	15
Rheumatism	19	13	6	9	6	4
Carbuncle	2	0	6	2	0	1
Phlegmon	2	1	6	0	1	1

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

† The population has been corrected on account of a change of boundary in 1850.

‡ No Return.

No. III.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION DISTRICTS during the Period 1848-54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	DUDLEY.		EASINGTON.		EAST STONEHOUSE.	
	Population in 1851 - 106,530 No. of Persons per Square Mile - - - 3,791 No. of Persons per Cent. in Towns - - 63 No. of Paupers per 1,000 Persons - - 35 Industry.—Mining and Iron Manufacture.		Population in 1851 - 21,795 No. of Persons per Square Mile - - - 362 No. of Persons per Cent. in Towns - - 0 No. of Paupers per 1,000 Persons - - 27 Industry.—Coal Mining.		Population in 1851 - 11,979 No. of Persons per Square Mile - - - 19,913 No. of Persons per Cent. in Towns - - 100 No. of Paupers per 1,000 Persons - - 58 Industry.—Naval.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	419	331	117	97	459	252
Small-pox	54	58	9	12	196	96
Measles	93	103	70	68	69	50
Scarlatina	128	134	120	93	144	109
Hooping-cough	46	60	40	57	66	71
Croup	37	35	26	29	25	29
Diarrhœa	237	219	74	72	94	105
Dysentery	4	6	1	4	19	2
Cholera	93	93	59	57	274	206
Influenza	5	3	0	0	11	13
Ague	1	0	4	14	0	0
Typhus	120	131	42	54	130	143
Rheumatic Fever	2	2	1	3	3	4
Erysipelas	12	10	4	6	19	17
Scrofula	13	10	4	1	33	4
Tabes Mesenterica	25	26	35	43	36	34
Phthisis	152	180	105	167	514	275
Hydrocephalus	36	33	91	87	80	44
Apoplexy	39	35	25	15	66	36
Paralysis	17	21	15	28	69	52
Convulsions	231	181	103	73	166	90
Bronchitis	122	108	11	15	141	120
Pneumonia	225	178	82	59	246	94
Teething	57	47	30	26	44	15
Rheumatism	11	7	0	3	17	4
Carbuncle	2	0	0	0	8	0
Phlegmon	2	1	0	0	3	0

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	ECCLESALL BIERLOW.		FARNHAM.		GARSTANG.	
	Population in 1851 - 37,914 No. of Persons per Square Mile - - - 1,163 No. of Persons per Cent. in Towns - - 92 No. of Paupers per 1,000 Persons - - 28 Industry.—Cutlery.		Population in 1851 - 11,743 No. of Persons per Square Mile - - - 241 No. of Persons per Cent. in Towns - - 29 No. of Paupers per 1,000 Persons - - 59 Industry.—Agriculture.		Population in 1851 - 12,695 No. of Persons per Square Mile - - - 130 No. of Persons per Cent. in Towns - - 0 No. of Paupers per 1,000 Persons - - 59 Industry.—Agriculture and Cotton Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	408	287	310	281	102	91
Small-pox	35	31	15	2	0	2
Measles	46	36	7	2	19	12
Scarlatina	127	120	51	36	162	131
Hooping-cough	42	55	37	39	19	21
Croup	27	25	10	10	35	23
Diarrhœa	145	128	98	99	26	33
Dysentery	32	35	5	7	19	2
Cholera	31	26	7	10	2	2
Influenza	10	8	20	10	45	28
Ague	1	0	0	0	2	0
Typhus	123	110	61	102	43	49
Rheumatic Fever	5	3	5	2	6	9
Erysipelas	20	24	10	15	9	16
Scrofula	13	9	12	15	9	2
Tabes Mesenterica	26	13	10	10	6	5
Phthisis	328	284	178	257	271	351
Hydrocephalus	64	49	12	24	17	9
Apoplexy	62	52	46	39	15	33
Paralysis	44	55	34	53	22	26
Convulsions	186	122	95	80	63	61
Bronchitis	114	94	142	153	19	12
Pneumonia	195	143	120	94	39	49
Teething	21	19	32	19	19	9
Rheumatism	8	7	15	7	0	5
Carbuncle	1	1	0	2	2	0
Phlegmon	3	1	2	0	2	0

* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. III.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Districts during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	GATESHEAD.		GLENDALE.		GRAVESEND.	
	Population in 1851 - 48,081 No. of Persons per Square Mile - - - 1,186 No. of Persons per Cent. in Towns - - 53 No of Paupers per 1,000 Persons - - 47 Industry.—Mining, Iron and Glass Manufacture.		Population in 1851 - 14,343 No. of Persons per Square Mile - - - 65 No. of Persons per Cent. in Towns - - 0 No. of Paupers per 1,000 Persons - - 53 Industry.—Agriculture, Coal Mining.		Population in 1851 - 16,633 No. of Persons per Square Mile - - 6,908 No. of Persons per Cent. in Towns - - 100 No. of Paupers per 1,000 Persons - - 38 Industry.—Maritime.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100 000.	Female per 100,000.
Diseases of the Respiratory Organs*	324	247	83	62	354	287
Small-pox	30	35	19	19	64	40
Measles	44	43	27	17	40	27
Scarlatina	92	89	143	113	92	97
Hooping-cough	38	44	12	31	39	56
Croup	30	31	31	21	9	13
Diarrhœa	87	92	31	27	143	131
Dysentery	15	20	8	4	59	6
Cholera	225	250	23	19	307	195
Influenza	8	3	10	10	7	3
Ague	2	2	0	0	18	3
Typhus	90	101	68	83	198	179
Rheumatic Fever	2	2	6	4	4	2
Erysipelas	11	10	6	4	15	15
Scrofula	25	19	8	8	11	10
Tabes Mesenterica	67	64	2	0	17	24
Phthisis	238	269	132	156	330	229
Hydrocephalus	83	74	23	15	50	34
Apoplexy	64	47	35	19	66	68
Paralysis	41	40	39	65	42	24
Convulsions	193	159	14	13	116	94
Bronchitis	93	70	25	17	141	148
Pneumonia	172	137	33	27	152	108
Teething	33	28	6	4	33	19
Rheumatism	8	3	4	2	11	11
Carbuncle	0	0	4	0	0	2
Phlegmon	1	2	23	12	2	2

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	HALIFAX.		HALTWHISTLE.		HEMEL HEMPSTEAD.	
	Population in 1851 - 120,958 No. of Persons per Square Mile - - - 1,495 No. of Persons per Cent. in Towns - - 28 No. of Paupers per 1,000 Persons - - 36 Industry.—Woollen Manufacture.		Population in 1851 - 7,286 No. of Persons per Square Mile - - - 56 No. of Persons per Cent. in Towns - - 0 No. of Paupers per 1,000 Persons - - 26 Industry.—Agriculture, Coal Mining.		Population in 1851 - 13,120 No. of Persons per Square Mile - - - 330 No. of Persons per Cent. in Towns - - 20 No. of Paupers per 1,000 Persons - - 64 Industry.—Agriculture, Straw Plait Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	281	224	96	52	275	156
Small-pox	30	31	7	4	43	25
Measles	61	53	7	8	38	29
Scarlatina	96	90	18	0	45	32
Hooping-cough	35	40	15	42	32	36
Croup	32	30	15	34	23	8
Diarrhœa	41	41	11	8	63	67
Dysentery	25	26	0	0	2	4
Cholera	12	7	15	0	47	40
Influenza	6	4	44	50	5	4
Ague	1	0	0	0	0	2
Typhus	67	80	48	21	115	145
Rheumatic Fever	3	6	0	4	2	2
Erysipelas	6	8	11	4	16	13
Scrofula	12	7	7	13	11	2
Tabes Mesenterica	24	19	0	0	14	21
Phthisis	266	340	232	347	165	240
Hydrocephalus	82	68	44	20	25	13
Apoplexy	42	42	18	8	47	25
Paralysis	26	30	70	71	34	27
Convulsions	337	261	7	20	131	72
Bronchitis	113	100	15	4	67	34
Pneumonia	105	78	44	12	133	80
Teething	65	55	22	12	27	13
Rheumatism	8	9	4	13	9	2
Carbuncle	1	0	0	0	0	0
Phlegmon	1	2	0	0	5	6

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. III.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Districts during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	HENDON.		HINCKLEY.		HOLSWORTHY.	
	Population in 1851 – 15,916 No. of Persons per Square Mile – – – 808 No. of Persons per Cent. in Towns – – 0 No. of Paupers per 1,000 Persons – – 40 Industry.—Agriculture.		Population in 1851 – 15,595 No. of Persons per Square Mile – – – 411 No. of Persons per Cent. in Towns – – 39 No. of Paupers per 1,000 Persons – – 73 Industry.—Hosiery Manufacture.		Population in 1851 – 11,382 No. of Persons per Square Mile – – – 84 No. of Persons per Cent. in Towns – – 0 No. of Paupers per 1,000 Persons – – 69 Industry.—Agriculture, Glove-making.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000,
Diseases of the Respiratory Organs*	207	172	342	285	295	196
Small-pox	5	7	15	11	0	5
Measles	14	18	31	35	7	3
Scarlatina	79	99	86	55	85	72
Hooping-cough	27	51	37	48	12	31
Croup	25	14	33	27	32	49
Diarrhœa	95	79	44	82	0	10
Dysentery	21	40	9	2	2	3
Cholera	43	18	0	2	2	3
Influenza	18	9	20	9	12	41
Ague	5	0	0	0	0	0
Typhus	70	65	116	144	44	59
Rheumatic Fever	12	5	4	0	0	0
Erysipelas	14	20	18	9	7	3
Scrofula	12	5	17	18	7	8
Tabes Mesenterica	39	20	42	37	7	3
Phthisis	227	200	310	318	156	230
Hydrocephalus	45	33	28	20	42	31
Apoplexy	52	58	50	44	27	36
Paralysis	34	67	51	44	24	31
Convulsions	52	40	191	155	34	10
Bronchitis	68	47	42	57	34	39
Pneumonia	82	94	197	155	205	134
Teething	23	11	22	27	5	3
Rheumatism	13	5	9	18	10	0
Carbuncle	2	0	0	0	2	0
Phlegmon	4	2	6	5	12	8

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	HOLYWELL.		HOUGHTON-LE-SPRING.		HUDDERSFIELD.	
	Population in 1851 – 41,047 No. of Persons per Square Mile – – – 294 No. of Persons per Cent. in Towns – – 22 No. of Paupers per 1,000 Persons – – 83 Industry.—Coal and Lead Mining.		Population in 1851 – 19,564 No. of Persons per Square Mile – – – 773 No. of Persons per Cent. in Towns – – 16 No. of Paupers per 1,000 Persons – – 38 Industry.—Coal Mining.		Population in 1851 – 123,860 No. of Persons per Square Mile – – – 1,191 No. of Persons per Cent. in Towns – – 25 No. of Paupers per 1,000 Persons – – 33 Industry.—Woollen Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	227	148	210	176	277	213
Small-pox	32	29	31	21	28	28
Measles	19	24	50	54	83	83
Scarlatina	74	71	43	64	118	114
Hooping-cough	49	54	20	31	46	46
Croup	27	17	19	12	28	23
Diarrhœa	34	25	50	40	67	62
Dysentery	2	4	6	3	16	19
Cholera	34	32	29	51	18	11
Influenza	5	4	3	6	3	4
Ague	1	0	0	1	0	0
Typhus	82	76	104	84	80	89
Rheumatic Fever	3	3	1	1	4	3
Erysipelas	2	1	4	6	12	10
Scrofula	12	12	11	13	17	13
Tabes Mesenterica	3	7	26	19	14	16
Phthisis	325	353	154	218	273	337
Hydrocephalus	16	17	53	40	66	61
Apoplexy	19	21	29	25	31	30
Paralysis	61	83	29	36	33	35
Convulsions	309	240	241	199	213	171
Bronchitis	84	70	69	66	93	77
Pneumonia	40	42	109	85	135	104
Teething	13	15	41	25	41	33
Rheumatism	5	5	3	7	11	7
Carbuncle	0	0	0	0	1	0
Phlegmon	2	0	0	0	3	3

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. III.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION DISTRICTS during the Period 1848-54—*continued.*

CAUSES OF DEATH. according to the Nomenclature of the Registrar-General.	HULL.		IPSWICH.		KIDDERMINSTER.	
	Population in 1851 - 50,670 No. of Persons per Square Mile - - - 17,750 No. of Persons per Cent. in Towns - - 100 No. of Paupers per 1,000 Persons † Industry.—Maritime.		Population in 1851 - 32,759 No. of Persons per Square Mile - - - 2,497 No. of Persons per Cent. in Towns - - 100 No. of Paupers per 1,000 Persons - - 63 Industry.—Commerce.		Population in 1851 - 32,917 No. of Persons per Square Mile - - - 564 No. of Persons per Cent. in Towns - - 65 No. of Paupers per 1,000 Persons - - 43 Industry.—Woollen Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	305	245	369	297	316	240
Small-pox	55	46	67	75	8	11
Measles	61	63	38	27	27	19
Scarlatina	92	94	50	65	46	41
Hooping-cough	37	49	36	53	10	12
Croup	15	16	7	4	12	17
Diarrhœa	149	151	182	144	71	73
Dysentery	59	49	12	9	11	7
Cholera	375	355	22	24	4	10
Influenza	4	7	6	5	18	11
Ague	2	1	0	1	0	0
Typhus	145	96	94	85	101	115
Rheumatic Fever	2	3	1	1	4	2
Erysipelas	14	14	9	7	8	9
Scrofula	21	11	12	9	8	5
Tabes Mesenterica	51	42	99	81	36	38
Phthisis	284	280	322	318	262	304
Hydrocephalus	66	49	34	25	39	29
Apoplexy	59	46	61	77	50	44
Paralysis	58	51	47	45	47	36
Convulsions	248	183	84	65	102	82
Bronchitis	79	79	79	72	80	68
Pneumonia	164	125	252	207	165	125
Teething	61	47	28	17	14	9
Rheumatism	6	5	6	7	7	3
Carbuncle	2	0	2	0	2	1
Phlegmon	2	0	7	3	4	3

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	KING'S NORTON.		KNARESBOROUGH.		LEEDS.	
	Population in 1851 - 30,871 No. of Persons per square Mile - - - 696 No. of Persons per Cent. in Towns - - 30 No. of Paupers per 1,000 Persons - - 24 Industry.—Hardware Manufacture.		Population in 1851 - 27,783 No. of Persons per Square Mile - - - 205 No. of Persons per Cent. in Towns - - 33 No. of Paupers per 1,000 Persons ‡ - - 28 Industry.—Agriculture, Linen Manufacture.		Popu'ation in 1851 - 101,343 No. of Persons per Square Mile - - - 30,886 No. of Persons per Cent in Towns - - 10 No. of Paupers per 1,000 Persons - - 48 Industry.—Woollen Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	330	254	272	196	511	444
Small-pox	13	13	43	55	57	50
Measles	36	33	18	23	79	82
Scarlatina	71	62	20	31	87	77
Hooping-cough	21	25	21	32	53	68
Croup	20	15	28	8	23	19
Diarrhœa	98	70	60	61	216	193
Dysentery	8	5	14	9	73	74
Cholera	11	8	37	25	200	230
Influenza	13	8	28	26	3	3
Ague	2	0	0	0	1	1
Typhus	76	77	52	69	144	120
Rheumatic Fever	3	3	5	1	2	1
Erysipelas	15	11	15	14	10	11
Scrofula	13	10	10	11	23	12
Tabes Mesenterica	24	25	12	9	48	41
Phthisis	186	211	193	255	306	274
Hydrocephalus	54	44	42	49	106	81
Apoplexy	51	39	53	38	83	59
Paralysis	28	35	55	51	33	30
Convulsions	70	45	214	143	276	223
Bronchitis	104	105	100	76	226	202
Pneumonia	186	124	92	69	191	181
Teething	13	10	11	10	42	34
Rheumatism	11	10	8	2	9	10
Carbuncle	0	2	1	1	1	0
Phlegmon	3	0	4	2	2	1

* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.
† No return. ‡ Return for one year only.

No. III.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION DISTRICTS during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	LEEK.		LEICESTER.		LEIGHTON BUZZARD.	
	Population in 1851 - 23,031 No. of Persons per Square Mile - - - 202 No. of Persons per Cent. in Towns - - 38 No. of Paupers per 1,000 Persons - - 30 Industry.—Silk Manufacture.		Population in 1851 - 60,642 No. of Persons per Square Mile - - - 9,801 No. of Persons per Cent. in Towns - - 100 No. of Paupers per 1,000 Persons - - 54 Industry.–Hosiery Manufacture.		Population in 1851 - 17,142 No. of Persons per Square Mile - - - 289 No. of Persons per Cent. in Towns - - 26 No. of Paupers per 1,000 Persons - - 51 Industry.—Agriculture, Straw Plait Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	212	188	352	266	267	183
Small-pox	42	36	45	33	22	15
Measles	34	36	89	81	24	10
Scarlatina	93	92	73	66	75	73
Hooping-cough	76	72	54	63	27	34
Croup	33	41	31	19	27	18
Diarrhœa	70	60	213	166	104	93
Dysentery	9	9	20	12	10	5
Cholera	4	4	6	4	20	28
Influenza	20	19	5	10	51	33
Ague	0	0	0	0	0	0
Typhus	72	93	141	168	189	217
Rheumatic Fever	7	5	2	1	3	2
Erysipelas	7	4	9	21	9	20
Scrofula	21	18	12	10	22	20
Tabes Mesenterica	18	10	27	17	43	24
Phthisis	376	517	388	393	197	296
Hydrocephalus	43	50	50	27	46	39
Apoplexy	45	40	43	34	32	57
Paralysis	44	31	42	34	85	42
Convulsions	188	113	209	144	116	82
Bronchitis	63	69	76	73	80	75
Pneumonia	119	97	206	141	143	83
Teething	16	10	36	30	9	7
Rheumatism	7	13	6	6	3	10
Carbuncle	2	1	2	1	0	0
Phlegmon	6	5	5	3	2	2

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	LEOMINSTER.		LEWES.		LISKEARD.	
	Population in 1851 - 14,910 No. of Persons per Square Mile - - - 145 No. of Persons per Cent. in Towns - - 34 No. of Paupers per 1,000 Persons - - 68 Industry.—Agriculture.		Population in 1851 - 25,719 No. of Persons per Square Mile - - - 193 No. of Persons per Cent. in Towns - - 37 No. of Paupers per 1,000 Persons - - 28 Industry.—Agriculture.		Population in 1851 - 33,831 No. of Persons per Square Mile - - - 191 No. of Persons per Cent. in Towns - - 13 No. of Paupers per 1,000 Persons - - 49 Industry.—Copper and Lead Mining.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	245	138	215	147	261	204
Small-pox	29	17	5	3	46	32
Measles	4	15	8	7	20	20
Scarlatina	59	90	48	69	92	93
Hooping-cough	17	33	26	28	42	56
Croup	17	21	11	25	11	20
Diarrhœa	34	21	56	52	45	39
Dysentery	6	4	5	2	3	0
Cholera	4	6	8	1	59	58
Influenza	15	15	20	19	20	19
Ague	0	0	2	2	0	0
Typhus	46	29	105	146	92	74
Rheumatic Fever	8	4	2	2	3	0
Erysipelas	4	4	8	9	7	7
Scrofula	13	12	23	18	6	4
Tabes Mesenterica	23	21	47	39	19	16
Phthisis	193	248	267	352	230	228
Hydrocephalus	19	21	32	39	24	23
Apoplexy	65	61	77	78	43	49
Paralysis	17	21	38	34	37	25
Convulsions	96	75	126	106	85	67
Bronchitis	21	21	70	52	41	33
Pneumonia	130	69	112	71	177	145
Teething	15	21	12	10	6	3
Rheumatism	6	15	3	6	3	2
Carbuncle	2	0	2	0	0	0
Phlegmon	0	0	0	0	3	2

* This head comprises Laryngitis, Bronchitis, Pleurisy Pneumonia Asthma, and Diseases of the Lungs

No. III.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Districts during the Period 1848-54—*continued.*

Causes of Death, according to the Nomenclature of the Registrar-General.	Liverpool.		Luton.		Macclesfield.	
	Population in 1851 – 258,236 No. of Persons per Square Mile – – 74,446 No. of Persons per Cent. in Towns – 100 No. of Paupers per 1,000 Persons† – 56 Industry.—Commerce.		Population in 1851 – 25,087 No. of Persons per Square Mile – – 393 No. of Persons per Cent. in Towns – 56 No. of Paupers for 1,000 Persons – 39 Industry.—Straw Bonnet Manufacture.		Population in 1851 – 63,327 No. of Persons per Square Mile – – 497 No. of Persons per Cent. in Towns – – 62 No. of Paupers per 1,000 Persons – 27 Industry.—Silk Manufacture.	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	649	537	248	223	349	305
Small-pox	45	37	72	55	32	36
Measles	107	108	42	38	47	34
Scarlatina	121	115	34	22	114	82
Hooping-cough	85	104	33	44	46	59
Croup	34	29	23	8	36	28
Diarrhœa	267	269	116	82	93	98
Dysentery	43	31	4	4	20	28
Cholera	330	385	18	13	17	15
Influenza	2	2	11	18	5	8
Ague	2	1	0	1	1	1
Typhus	157	138	132	152	101	102
Rheumatic Fever	2	3	1	4	2	1
Erysipelas	22	18	10	20	10	9
Scrofula	17	11	10	3	27	16
Tabes Mesenterica	45	44	9	5	33	26
Phthisis	413	402	310	314	342	499
Hydrocephalus	116	81	36	17	79	45
Apoplexy	44	35	40	46	42	41
Paralysis	38	32	47	49	40	41
Convulsions	235	189	139	82	183	134
Bronchitis	331	298	105	87	102	108
Pneumonia	233	174	103	95	167	142
Teething	29	27	13	16	30	27
Rheumatism	5	6	1	3	9	11
Carbuncle	2	1	0	1	1	0
Phlegmon	2	1	11	9	3	2

Causes of Death, according to the Nomenclature of the Registrar-General.	Madeley.		Maidstone.		Manchester.	
	Population in 1851 – 27,627 No. of Persons per Square Mile – – 633 No. of Persons per Cent. in Towns – 81 No. of Paupers per 1,000 Persons – – 43 Industry.—Coal Mining, Iron Manufacture.		Population in 1851 – 36,097 No. of Persons per Square Mile – – 607 No. of Persons per Cent. in Towns – 57 No of Paupers per 1,000 Persons – 62 Industry.—Agriculture.		Population in 1851 – 228,433 No. of Persons per Square Mile – – 11,577 No. of Persons per Cent. in Towns – 93 No. of Paupers per 1,000 Persons – 49 Industry.—Cotton Manufacture.	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	280	184	315	248	511	439
Small-pox	36	32	21	12	29	23
Measles	41	50	36	20	86	76
Scarlatina	129	114	77	60	147	137
Hooping-cough	41	65	36	48	81	96
Croup	25	30	16	9	42	30
Diarrhœa	15	20	127	132	288	236
Dysentery	1	4	13	14	45	37
Cholera	42	16	85	76	57	67
Influenza	4	9	19	18	4	4
Ague	1	0	6	1	1	1
Typhus	82	83	79	88	149	141
Rheumatic Fever	4	2	2	2	2	2
Erysipelas	11	8	6	9	14	12
Scrofula	9	12	15	13	17	9
Tabes Mesenterica	10	8	27	22	34	27
Phthisis	243	316	265	314	394	377
Hydrocephalus	25	26	35	35	74	49
Apoplexy	42	37	71	52	49	38
Paralysis	21	19	64	55	46	44
Convulsions	226	185	139	104	298	219
Bronchitis	16	14	83	78	221	204
Pneumonia	175	132	174	129	205	159
Teething	42	22	32	26	82	64
Rheumatism	8	6	8	6	5	7
Carbuncle	2	0	2	2	2	0
Phlegmon	4	6	2	1	3	2

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.
† Average for two years.

No. III.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Districts during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	MELKSHAM.		MERTHYR TYDFIL.		NEWCASTLE-ON-TYNE.	
	Population in 1851 - 18,815 No. of Persons per Square Mile - - - 678 No. of Persons per Cent. in Towns - - 69 No. of Paupers per 1,000 Persons - - 102 Industry.—Woollen Manufacture.		Population in 1851 - 76,804 No. of Persons per Square Mile - - - 435 No. of Persons per Cent. in Towns - - 80 No. of Paupers per 1,000 Persons - - 45 Industry.—Coal Mining and Iron Manufacture.		Population in 1851 - 89,156 No. of Persons per Square Mile - - - 8,034 No. of Persons per Cent. in Towns - - 98 No. of Paupers per 1,000 Persons† - - 71 Industry.—Commerce.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	407	343	282	208	379	310
Small-pox	22	20	103	101	48	47
Measles	16	13	53	62	55	49
Scarlatina	54	35	113	131	84	70
Hooping-cough	27	35	43	57	74	91
Croup	21	10	39	58	25	18
Diarrhœa	74	88	109	125	130	120
Dysentery	2	1	16	14	15	12
Cholera	3	4	398	409	270	293
Influenza	19	22	4	6	6	7
Ague	0	0	0	0	3	3
Typhus	120	171	211	202	114	102
Rheumatic Fever	0	3	1	0	2	1
Erysipelas	17	19	6	3	23	21
Scrofula	25	23	25	12	18	9
Tabes Mesenterica	51	32	27	22	73	60
Phthisis	249	216	379	446	312	284
Hydrocephalus	32	22	24	15	78	65
Apoplexy	48	85	21	28	38	42
Paralysis	44	69	22	23	51	45
Convulsions	138	83	386	377	209	198
Bronchitis	93	122	85	67	142	125
Pneumonia	233	162	141	111	153	117
Teething	14	12	23	24	40	36
Rheumatism	5	3	3	3	5	3
Carbuncle	0	1	0	0	1	0
Phlegmon	0	0	1	1	2	1

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	NEW FOREST.		NEWPORT PAGNELL.		NORTHAMPTON.	
	Population in 1851 - 13,540 No. of Persons per Square Mile - - - 101 No. of Persons per Cent. in Towns - - 0 No. of Paupers per 1,000 Persons - - 73 Industry.—Agriculture.		Population in 1851 - 23,109 No. of Persons per Square Mile - - - 215 No. of Persons per Cent. in Towns - - 14 No. of Paupers per 1,000 Persons - - 88 Industry.—Agriculture and Lace Manufacture.		Population in 1851 - 33,857 No. of Persons per Square Mile - - - 1,037 No. of Persons per Cent. in Towns - - 79 No. of Paupers per 1,000 Persons - - 39 Industry.—Shoemaking.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	187	199	197	202	244	227
Small-pox	48	40	6	5	39	38
Measles	15	23	27	30	60	52
Scarlatina	44	59	63	60	94	77
Hooping-cough	13	23	34	38	41	44
Croup	17	23	23	16	15	22
Diarrhœa	40	55	54	51	66	62
Dysentery	2	4	8	2	14	11
Cholera	6	8	10	8	25	26
Influenza	25	15	47	63	14	23
Ague	0	4	1	1	0	0
Typhus	86	104	86	95	130	155
Rheumatic Fever	2	0	3	1	3	2
Erysipelas	13	11	6	7	12	14
Scrofula	11	8	27	17	12	20
Tabes Mesenterica	11	11	28	23	59	50
Phthisis	238	322	233	343	320	307
Hydrocephalus	42	23	33	12	24	27
Apoplexy	74	66	44	60	51	30
Paralysis	42	40	49	59	64	62
Convulsions	88	83	104	70	145	111
Bronchitis	44	76	37	48	51	56
Pneumonia	99	91	109	104	130	114
Teething	15	4	10	17	50	49
Rheumatism	2	4	1	7	0	3
Carbuncle	0	0	1	0	3	0
Phlegmon	0	4	8	4	10	6

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.
† Average for six years.

No. III.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION DISTRICTS during the Period 1848-54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	NORTH WITCHFORD.		NORWICH.		NOTTINGHAM.	
	Population in 1851 - 16,243 No. of Persons per Square Mile - - - 174 No. of Persons per Cent. in Towns - - 25 No. of Paupers per 1,000 Persons - - 56 Industry.—Agriculture.		Population in 1851 - 68,195 No. of Persons per Square Mile - - - 10,091 No. of Persons per Cent. in Towns - - 100 No. of Paupers per 1,000 Persons† Industry.—Silk and Shoe Manufacture.		Population in 1851 - 58,419 No. of Persons per Square Mile - - - 19,994 No. of Persons per Cent. in Towns - - 98 No. of Paupers per 1,000 Persons - - 47 Industry.—Lace, Hosiery.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	263	184	296	234	452	384
Small-pox	42	33	49	41	42	38
Measles	39	32	49	33	74	67
Scarlatina	51	51	153	127	65	67
Hooping-cough	26	33	50	47	62	61
Croup	30	25	10	10	16	12
Diarrhœa	97	67	179	132	206	149
Dysentery	14	14	4	2	23	11
Cholera	92	47	51	51	18	14
Influenza	5	7	5	8	6	12
Ague	7	5	0	0	0	0
Typhus	118	100	89	91	110	111
Rheumatic Fever	4	0	3	3	4	3
Erysipelas	7	5	16	17	14	12
Scrofula	26	19	20	17	23	12
Tabes Mesenterica	9	28	29	20	36	26
Phthisis	222	333	259	286	361	319
Hydrocephalus	34	25	40	24	59	35
Apoplexy	25	40	44	47	46	44
Paralysis	16	25	69	66	43	51
Convulsions	67	47	124	91	260	177
Bronchitis	51	60	105	95	137	137
Pneumonia	178	102	138	96	236	177
Teething	12	19	28	21	19	15
Rheumatism	7	2	5	7	11	6
Carbuncle	2	2	4	0	2	0
Phlegmon	5	5	1	1	2	0

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	PATELEY BRIDGE.		PENZANCE.		PLYMOUTH.	
	Population in 1851 - 7,579 No of Persons per Square Mile - - - 72 No. of Persons per Cent. in Towns - - 0 No. of Paupers per 1,000 Persons - - 58 Industry.—Agriculture. Flax Manufacture, Lead Mining.		Population in 1851 - 53,517 No. of Persons per Square Mile - - - 525 No. of Persons per Cent in Towns - - 29 No. of Paupers per 1,000 Persons - - 21 Industry.—Tin Mining.		Population in 1851 - 52,221 No. of Persons per Square Mile - - - 20,441 No. of Persons per Cent. in Towns - - 100 No. of Paupers per 1,000 Persons† Industry.—Naval.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	174	65	215	145	413	344
Small-pox	15	11	115	95	136	123
Measles	15	27	39	43	68	52
Scarlatina	37	50	76	66	138	114
Hooping-cough	15	42	52	53	71	74
Croup	52	31	30	24	22	14
Diarrhœa	33	42	63	46	109	97
Dysentery	7	0	57	69	24	32
Cholera	11	8	13	9	272	260
Influenza	59	69	12	15	10	10
Ague	0	0	1	0	0	0
Typhus	122	92	62	69	143	142
Rheumatic Fever	0	0	2	4	1	3
Erysipelas	4	19	10	8	11	10
Scrofula	4	19	9	8	10	11
Tabes Mesenterica	4	8	33	31	25	19
Phthisis	334	326	345	311	244	225
Hydrocephalus	37	11	22	18	60	37
Apoplexy	33	34	26	30	55	61
Paralysis	22	31	45	52	44	36
Convulsions	197	157	48	36	111	77
Bronchitis	56	27	57	30	224	199
Pneumonia	74	23	116	86	145	113
Teething	33	19	15	9	19	13
Rheumatism	4	15	5	3	6	3
Carbuncle	0	0	1	0	2	0
Phlegmon	4	0	3	4	2	1

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

† No Return.

No. III.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Districts during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	Portsea Island.		Preston.		Radford.	
	Population in 1851 – 72,126 No. of Persons per Square Mile – – – 5,914 No. of Persons per Cent. in Towns – – 100 No. of Paupers per 1,000 Persons – – 71 Industry.—Naval.		Population in 1851 – 96,545 No. of Persons per Square Mile – – – 908 No. of Persons per Cent. in Towns – – 75 No. of Paupers per 1,000 Persons – – 55 Industry.—Cotton Manufacture.		Population in 1851 – 26,776 No. of Persons per Square Mile – – – 2,520 No. of Persons per Cent. in Towns – – 0 No. of Paupers per 1,000 Persons – – 25 Industry.—Lace, Hosiery.	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	370	294	429	367	389	292
Small-pox	105	97	22	22	38	36
Measles	35	34	76	73	43	30
Scarlatina	77	77	111	88	108	76
Hooping-cough	37	46	50	69	45	41
Croup	12	10	37	37	23	26
Diarrhœa	113	104	157	135	126	125
Dysentery	23	21	51	51	20	28
Cholera	114	128	8	10	14	15
Influenza	4	43	9	10	14	10
Ague	1	0	0	1	0	0
Typhus	126	152	102	103	108	108
Rheumatic Fever	1	2	1	3	3	2
Erysipelas	17	16	7	8	11	15
Scrofula	16	11	20	15	21	19
Tabes Mesenterica	51	42	30	22	33	28
Phthisis	308	264	347	401	275	380
Hydrocephalus	55	35	53	33	57	43
Apoplexy	71	76	45	40	43	30
Paralysis	63	71	24	28	46	46
Convulsions	134	109	226	185	261	179
Bronchitis	148	132	194	184	98	101
Pneumonia	165	129	190	148	256	165
Teething	48	40	47	44	28	19
Rheumatism	6	4	7	6	7	6
Carbuncle	2	0	1	1	1	0
Phlegmon	3	4	2	2	6	5

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	Redruth.		Reeth.		Richmond (Yorkshire).	
	Population in 1851 – 53,628 No. of Persons per Square Mile – – – 852 No. of Persons per Cent. in Towns – – 25 No. of Paupers per 1,000 Persons – – 40 Industry.—Copper and Tin Mining.		Population in 1851 - 6,820 No. of Persons per Square Mile – – – 62 No. of Persons per Cent. in Towns – – 0 No. of Paupers per 1,000 Persons – – 54 Industry.—Lead Mining.		Population in 1851 – 13,846 No. of Persons per Square Mile – – – 113 No. of Persons per Cent. in Towns – – 29 No. of Paupers per 1,000 Persons – – 44 Industry.—Agriculture.	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	222	127	549	266	227	213
Small-pox	95	74	0	0	4	0
Measles	57	54	8	21	11	2
Scarlatina	63	51	50	34	59	51
Hooping-cough	71	80	29	25	13	43
Croup	31	23	50	30	32	20
Diarrhœa	36	32	25	51	34	47
Dysentery	3	1	4	0	15	10
Cholera	44	51	0	0	15	8
Influenza	8	8	29	38	19	12
Ague	0	0	0	0	0	0
Typhus	74	75	37	51	50	22
Rheumatic Fever	3	2	0	4	4	4
Erysipelas	4	5	12	8	17	16
Scrofula	8	7	25	34	10	16
Tabes Mesenterica	17	18	25	8	19	10
Phthisis	443	323	175	262	172	238
Hydrocephalus	45	28	50	8	34	37
Apoplexy	22	28	33	46	55	59
Paralysis	22	44	67	63	19	28
Convulsions	68	47	154	93	109	67
Bronchitis	42	22	125	13	97	99
Pneumonia	146	87	229	181	105	83
Teething	12	8	17	8	6	6
Rheumatism	4	4	17	17	8	12
Carbuncle	0	1	0	0	2	0
Phlegmon	1	2	0	4	4	6

* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. III.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Districts during the Period 1848-54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar General.	Rochdale.		Romney Marsh.		Saffron Walden.	
	Population in 1851 - 72,515 No. of Persons per Square Mile - - - 1,150 No. of Persons per Cent. in Towns - - 40 No. of Paupers per 1,000 Persons - - 34 Industry.—Cotton and Woollen Manufacture.		Population in 1851 - 5,437 No. of Persons per Square Mile - - - 74 No. of Persons per Cent. in Towns - - 0 No. of Paupers per 1,000 Persons - - 57 Industry.—Agriculture.		Population in 1851 - 20,716 No. of Persons per Square Mile - - - 212 No. of Persons per Cent. in Towns - - 28 No. of Paupers per 1,000 Persons - - 103 Industry.—Agriculture.	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	301	226	222	118	251	262
Small-pox	43	35	0	0	10	10
Measles	83	73	5	0	34	20
Scarlatina	103	86	36	48	65	66
Hooping-cough	37	49	52	37	27	49
Croup	42	41	31	5	4	4
Diarrhœa	87	77	47	48	41	48
Dysentery	12	16	0	0	5	0
Cholera	16	10	0	16	3	3
Influenza	6	2	10	21	11	14
Ague	0	0	0	0	0	0
Typhus	98	106	93	86	113	121
Rheumatic Fever	3	5	0	0	1	4
Erysipelas	18	15	21	0	4	1
Scrofula	21	12	10	21	19	18
Tabes Mesenterica	22	16	36	27	12	25
Phthisis	329	362	140	224	269	350
Hydrocephalus	81	77	10	32	29	18
Apoplexy	32	31	41	48	52	62
Paralysis	31	35	26	21	45	62
Convulsions	241	190	134	134	113	64
Bronchitis	105	90	98	32	72	84
Pneumonia	134	101	98	69	125	130
Teething	47	37	16	16	14	6
Rheumatism	9	11	10	0	11	10
Carbuncle	2	0	5	0	0	0
Phlegmon	4	3	5	0	5	1

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	Salford.		Sculcoates.		Sheffield.	
	Population in 1851 - 87,523 No. of Persons per Square Mile - - - 11,597 No. of Persons per Cent. in Towns - - 97 No. of Paupers per 1,000 Persons - - 32 Industry.—Cotton Manufacture.		Population in 1851 - 44,719 No. of Persons per Square Mile - - - 635 No. of Persons per Cent. in Towns - - 76 No. of Paupers per 1,000 Persons - - 36 Industry.—Commerce.		Population in 1851 - 103,626 No. of Persons per Square Mile - - - 6,263 No. of Persons per Cent. in Towns - - 97 No. of Paupers per 1,000 Persons - - 39 Industry.—Hardware.	
	Death-Rates.		Death-Rates.		Death-Rates.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	463	407	242	195	465	361
Small-pox	21	19	22	24	73	78
Measles	77	82	58	47	72	79
Scarlatina	154	142	87	84	112	111
Hooping-cough	80	91	35	45	65	92
Croup	39	23	19	19	27	23
Diarrhœa	284	244	192	155	194	189
Dysentery	36	27	59	59	33	42
Cholera	43	52	232	233	44	37
Influenza	5	5	4	10	5	4
Ague	1	2	0	0	1	0
Typhus	99	83	124	97	167	133
Rheumatic Fever	1	1	2	1	2	2
Erysipelas	13	10	15	11	16	18
Scrofula	9	7	16	5	18	10
Tabes Mesenterica	14	11	41	29	32	31
Phthisis	303	299	196	223	374	309
Hydrocephalus	87	63	73	41	78	59
Apoplexy	36	31	47	34	57	43
Paralysis	51	48	50	44	45	37
Convulsions	236	175	262	153	270	201
Bronchitis	234	232	85	67	158	143
Pneumonia	163	128	116	97	203	160
Teething	66	50	59	44	48	45
Rheumatism	9	8	9	6	6	7
Carbuncle	1	1	1	0	1	0
Phlegmon	2	1	1	0	1	2

* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. III.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION DISTRICTS during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	SPALDING.		STAFFORD.		STOKE DAMEREL.	
	Population in 1851 - 21,290 No. of Persons per Square Mile - - - 194 No. of Persons per Cent. in Towns - - 36 No. of Paupers per 1,000 Persons - - 50 Industry.—Agriculture.		Population in 1851 - 22,787 No. of Persons per Square Mile - - - 230 No. of Persons per Cent. in Towns - - 52 No. of Paupers per 1,000 Persons - - 29 Industry. –Shoe-making.		Population in 1851 - 38,180 No. of Persons per Square Mile - - - 10,266 No. of Persons per Cent. in Towns - - 100 No. of Paupers per 1,000 Persons† Industry.—Naval.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	291	268	288	233	398	288
Small-pox	5	3	58	42	50	48
Measles	42	27	46	43	89	86
Scarlatina	100	72	64	76	156	105
Hooping-cough	47	41	23	32	70	65
Croup	23	21	21	20	18	12
Diarrhœa	64	84	42	51	138	108
Dysentery	5	13	16	18	8	2
Cholera	4	4	11	1	303	184
Influenza	18	21	7	10	32	24
Ague	5	3	2	0	3	0
Typhus	96	80	105	98	136	137
Rheumatic Fever	3	1	0	1	4	3
Erysipelas	14	11	25	15	15	7
Scrofula	18	7	21	4	16	16
Tabes Mesenterica	7	17	25	24	38	30
Phthisis	185	210	291	321	306	237
Hydrocephalus	20	20	30	19	60	47
Apoplexy	45	51	49	34	102	97
Paralysis	26	28	38	41	63	46
Convulsions	150	120	95	88	90	66
Bronchitis	138	142	91	94	96	91
Pneumonia	123	87	153	115	199	128
Teething	47	27	10	9	34	30
Rheumatism	7	8	11	6	6	7
Carbuncle	4	1	2	0	0	0
Phlegmon	0	0	6	4	5	3

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	STOKE-UPON-TRENT.		STROUD.		SWANSEA.	
	Population in 1851 - 57,942 No. of Persons per Square Mile - - - 3,535 No. of Persons per Cent. in Towns - - 95 No. of Paupers per 1,000 Persons‡ - - 25 Industry.—Earthenware, Coal Mining.		Population in 1851 - 37,386 No. of Persons per Square Mile - - - 547 No. of Persons per Cent. in Towns - - 23 No. of Paupers per 1,000 Persons - - 62 Industry.—Woollen Manufacture.		Population in 1851 - 46,907 No. of Persons per Square Mile - - - 289 No. of Persons per Cent. in Towns - - 67 No. of Paupers per 1,000 Persons - - 51 Industry.—Coal Mining, Copper Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	381	299	293	236	303	266
Small-pox	40	38	6	11	60	53
Measles	79	65	21	28	15	12
Scarlatina	169	171	88	80	39	48
Hooping-cough	39	56	29	34	57	48
Croup	41	35	14	9	40	35
Diarrhœa	105	112	45	61	41	33
Dysentery	10	9	5	6	6	5
Cholera	37	29	21	18	76	96
Influenza	10	13	18	18	8	9
Ague	0	0	1	0	0	0
Typhus	91	100	79	102	136	120
Rheumatic Fever	2	2	1	1	3	1
Erysipelas	12	7	5	7	4	5
Scrofula	19	8	19	29	9	9
Tabes Mesenterica	31	28	53	63	16	8
Phthisis	340	366	218	275	304	309
Hydrocephalus	60	39	41	20	10	7
Apoplexy	40	49	48	44	26	25
Paralysis	35	40	51	70	40	35
Convulsions	284	218	67	62	218	188
Bronchitis	127	109	59	50	152	142
Pneumonia	173	153	161	134	102	82
Teething	30	26	6	8	19	14
Rheumatism	7	6	6	9	9	6
Carbuncle	1	0	2	1	0	1
Phlegmon	1	1	4	2	2	2

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

† No Return.

‡ Average for two years.

No. III.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Districts during the Period 1848-54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	TOWCESTER.		TYNEMOUTH.		ULVERSTONE.	
	Population in 1851 – 12,806 No. of Persons per Square Mile – – – 194 No. of Persons per Cent. in Towns – – 19 No. of Paupers per 1,000 Persons – – 67 Industry.—Agriculture and Lace Manufacture.		Population in 1851 – 64,248 No. of Persons per Square Mile – – – 1,035 No. of Persons per Cent. in Towns – – 45 No. of Paupers per 1,000 Persons – – 49 Industry.—Coal Mining, Iron Manufacture, Commerce.		Population in 1851 – 30,556 No. of Persons per Square Mile – – – 145 No. of Persons per Cent. in Towns – – 21 No. of Paupers per 1,000 Persons – 38 Industry.—Agriculture, Iron and Copper Mining and Slate Quarrying.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	259	206	297	257	208	162
Small-pox	14	4	28	17	15	13
Measles	37	15	35	29	17	11
Scarlatina	46	54	96	99	132	151
Hooping-cough	39	37	38	43	33	44
Croup	25	20	24	19	36	27
Diarrhœa	55	65	82	81	43	55
Dysentery	5	9	8	7	6	3
Cholera	87	115	229	247	4	5
Influenza	14	24	7	5	24	30
Ague	2	0	2	1	1	1
Typhus	131	161	87	77	65	83
Rheumatic Fever	0	2	2	1	2	2
Erysipelas	9	15	9	10	10	10
Scrofula	23	17	18	7	18	16
Tabes Mesenterica	18	17	63	57	27	15
Phthisis	216	367	210	249	243	268
Hydrocephalus	37	48	67	39	34	26
Apoplexy	80	89	60	53	34	45
Paralysis	48	63	49	51	37	53
Convulsions	71	37	132	103	70	61
Bronchitis	62	54	114	126	73	57
Pneumonia	172	124	131	104	89	75
Teething	7	17	24	21	22	15
Rheumatism	7	7	3	6	5	4
Carbuncle	0	0	0	0	3	1
Phlegmon	7	2	1	2	4	3

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	WEARDALE.		WELLINGBOROUGH.		WEST DERBY.	
	Population in 1851 – 14,567 No. of Persons per Square Mile – – – 103 No. of Persons per Cent. in Towns – – 0 No. of Paupers per 1,000 Persons – – 44 Industry.—Lead Mining.		Population in 1851 † – 21,367 No. of Persons per Square Mile – – – 246 No. of Persons per Cent. in Towns – – 24 No. of Paupers per 1,000 Persons – – 71 Industry.—Shoe-making.		Population in 1851 – 153,279 No. of Persons per Square Mile – – – 1,940 No. of Persons per Cent. in Towns – – 76 No. of Paupers per 1,000 Persons – – 35 Industry.—Commerce, &c.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	291	191	196	150	392	312
Small-pox	9	6	7	3	30	23
Measles	25	28	71	51	74	62
Scarlatina	46	53	103	94	172	144
Hooping-cough	32	39	50	64	64	70
Croup	28	22	30	34	32	28
Diarrhœa	40	53	63	44	142	124
Dysentery	8	16	1	8	38	33
Cholera	9	2	11	7	129	138
Influenza	70	81	75	56	7	8
Ague	0	0	0	0	1	1
Typhus	72	81	102	182	100	91
Rheumatic Fever	0	0	3	1	4	2
Erysipelas	13	4	12	4	17	15
Scrofula	25	14	20	7	15	10
Tabes Mesenterica	13	10	10	15	30	21
Phthisis	241	306	253	381	339	320
Hydrocephalus	21	45	18	17	99	74
Apoplexy	27	43	30	22	46	45
Paralysis	32	55	41	72	25	34
Convulsions	104	63	136	109	180	125
Bronchitis	93	81	27	17	188	158
Pneumonia	144	85	128	88	158	115
Teething	17	0	31	12	29	25
Rheumatism	6	10	4	14	7	7
Carbuncle	0	0	1	0	3	1
Phlegmon	0	0	10	4	2	1

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

† The population has been corrected for a slight change of boundary in 1849.

No. III.—Average Annual Proportion of Deaths from the several under-mentioned Causes in the several under-mentioned Registration Districts during the Period 1848-54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	WHITTLESEY.		WIGAN.		WISBECH.	
	Population in 1851 - 7,687 No. of Persons per Square Mile - - - 196 No. of Persons per Cent. in Towns - - 71 No. of Paupers per 1,000 Persons - - 57 Industry.—Agriculture.		Population in 1851 - 77,539 No. of Persons per Square Mile - - - 1,055 No. of Persons per Cent. in Towns - - 50 No. of Paupers per 1,000 Persons - - 50 Industry.—Coal Mining, Cotton Manufacture.		Population in 1851 - 36,215 No. of Persons per Square Mile - - - 176 No. of Persons per Cent. in Towns - - 35 No. of Paupers per 1,000 Persons - - 78 Industry.—Agriculture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	208	165	335	302	253	236
Small-pox	46	50	26	30	6	9
Measles	54	72	77	75	48	59
Scarlatina	139	82	158	145	105	112
Hooping-cough	69	86	58	68	72	80
Croup	19	22	64	43	18	20
Diarrhœa	154	93	181	194	94	71
Dysentery	0	4	34	24	3	5
Cholera	66	32	139	133	136	133
Influenza	31	22	7	7	10	18
Ague	8	4	1	0	4	11
Typhus	139	133	122	144	138	118
Rheumatic Fever	0	7	4	2	3	2
Erysipelas	8	7	13	14	18	20
Scrofula	4	22	16	9	16	9
Tabes Mesenterica	8	4	31	23	34	12
Phthisis	270	276	263	342	235	262
Hydrocephalus	12	22	37	28	43	33
Apoplexy	19	29	33	30	34	34
Paralysis	39	54	32	40	22	40
Convulsions	123	129	322	263	147	116
Bronchitis	50	50	132	143	78	87
Pneumonia	104	65	126	103	113	91
Teething	39	22	78	63	54	40
Rheumatism	0	0	10	19	9	2
Carbuncle	0	0	1	1	0	2
Phlegmon	8	4	3	1	6	5

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	WOLSTANTON.		WOLVERHAMPTON.		WORCESTER.	
	Population in 1851 - 41,916 No. of Persons per Square Mile - - - 1,961 No. of Persons per Cent. in Towns - - 68 No. of Paupers per 1,000 Persons - - 35 Industry.—Earthenware, Coal Mining.		Population in 1851 - 104,158 No. of Persons per Square Mile - - - 1,237 No. of Persons per Cent. in Towns - - 86 No. of Paupers per 1,000 Persons - - 24 Industry.—Coal Mining, Iron Manufacture.		Population in 1851 - 27,677 No. of Persons per Square Mile - - - 2,644 No. of Persons per Cent. in Towns - - 99 No. of Paupers per 1,000 Persons - - 47 Industry.—Gloves, &c.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	466	354	494	400	326	235
Small-pox	39	34	69	63	33	24
Measles	35	49	109	110	23	26
Scarlatina	115	116	105	112	100	83
Hooping-cough	23	32	51	62	32	29
Croup	38	34	28	26	26	16
Diarrhœa	149	136	191	183	105	68
Dysentery	9	9	15	16	5	5
Cholera	34	40	207	193	51	43
Influenza	2	4	9	9	17	21
Ague	0	0	1	0	2	0
Typhus	94	92	158	145	72	73
Rheumatic Fever	3	1	5	3	3	0
Erysipelas	5	11	9	11	31	13
Scrofula	15	15	13	12	14	10
Tabes Mesenterica	40	36	56	54	5	6
Phthisis	260	373	237	292	320	318
Hydrocephalus	53	37	29	18	31	22
Apoplexy	35	36	35	30	79	58
Paralysis	23	33	26	27	69	65
Convulsions	252	213	210	191	105	56
Bronchitis	92	90	100	91	77	69
Pneumonia	231	179	277	231	151	113
Teething	36	25	55	48	32	22
Rheumatism	7	8	6	6	15	8
Carbuncle	0	0	1	1	0	1
Phlegmon	6	6	2	1	0	0

* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. III.—AVERAGE ANNUAL PROPORTION OF DEATHS from the several under-mentioned CAUSES in the several under-mentioned REGISTRATION DISTRICTS during the Period 1848–54—*continued.*

CAUSES OF DEATH, according to the Nomenclature of the Registrar-General.	WREXHAM.		WYCOMBE.		YEOVIL.	
	Population in 1851 - 42,295 No. of Persons per Square Mile - - - 312 No. of Persons per Cent. in Towns - - 16 No. of Paupers per 1,000 Persons - - 49 Industry.—Mining, Iron Manufacture.		Population in 1851 - 33,562 No. of Persons per Square Mile - - - 264 No. of Persons per Cent. in Towns - - 30 No. of Paupers per 1,000 Persons - - 82 Industry.—Agriculture, Lace, Paper, &c.		Population in 1851 - 28,463 No. of Persons per Square Mile - - - 249 No. of Persons per Cent. in Towns - - 28 No. of Paupers per 1,000 Persons - - 69 Industry.—Agriculture, Glove Manufacture.	
	DEATH-RATES.		DEATH-RATES.		DEATH-RATES.	
	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.	Male per 100,000.	Female per 100,000.
Diseases of the Respiratory Organs*	311	236	233	204	306	249
Small-pox	69	58	27	21	47	42
Measles	38	25	42	31	28	16
Scarlatina	116	122	43	44	61	73
Hooping-cough	21	23	35	41	33	44
Croup	31	21	9	8	19	17
Diarrhœa	49	50	67	58	40	32
Dysentery	6	4	21	5	1	0
Cholera	5	3	71	59	3	5
Influenza	6	9	18	14	38	35
Ague	0	0	0	0	1	1
Typhus	114	124	115	139	81	106
Rheumatic Fever	3	3	0	3	2	1
Erysipelas	8	10	9	6	20	20
Scrofula	21	10	14	10	25	28
Tabes Mesenterica	17	10	36	33	30	37
Phthisis	255	306	224	331	222	342
Hydrocephalus	17	16	34	20	39	24
Apoplexy	26	29	31	51	38	37
Paralysis	47	39	35	43	27	42
Convulsions	378	314	60	42	79	44
Bronchitis	126	110	48	60	71	60
Pneumonia	93	83	122	106	155	128
Teething	11	5	14	8	11	17
Rheumatism	1	5	5	4	8	10
Carbuncle	0	0	4	1	0	0
Phlegmon	1	1	15	5	1	1

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* This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No. IV.—Average Annual Proportion of Deaths in the several under-mentioned Districts from the several under-mentioned Causes at several Periods of Life during the Period 1848–54.

NAME OF DISTRICT.	Per 100,000 Males and Females living at each under-mentioned Period of Life.											
	All Causes.		Pulmonary Affections.*			Diseases of the Respiratory Organs.†		Phthisis.		Diarrhœa.	Typhus.	
	All Ages.	Under 5 Years.	All Ages.	Under 5 Years.	Above 20 Years.	Under 5 Years.	Above 20 Years.	Under 5 Years.	Above 20 Years.	Under 5 Years.	Under 20 Years.	Above 20 Years.
MALES.												
New Forest .	1,701	3,740	425	461	625	369	242	92	383	108	79	92
Towcester . . .	2,321	7,134	475	1,558	426	1,152	177	406	249	152	130	131
Glendale . . .	1,555	3,499	215	259	306	173	99	86	207	57	62	74
Haltwhistle . .	1,628	3,704	328	448	374	308	95	140	279	0	35	57
Easington . . .	1,804	6,150	222	496	221	496	66	0	155	425	36	48
Houghton-le-Spring .	2,057	6,581	364	832	368	803	156	29	212	242	120	88
Redruth . . .	2,256	6,950	670	1,231	942	700	217	531	725	169	71	77
Alston . . .	2,037	4,288	877	561	1,440	443	777	118	663	29	17	40
Reeth	2,051	4,321	724	633	1,298	633	869	0	329	82	49	25
Carnarvon . . .	2,216	6,100	514	390	759	223	243	167	516	28	43	115
Liverpool . .	3,814	14,938	1,062	3,092	1,044	2,733	495	359	549	1,793	117	186
Bristol . . .	3,220	10,008	979	2,072	1,146	1,929	520	143	626	890	117	89
Hull	3,161	10,203	589	1,465	643	1,181	253	171	390	839	148	142
Birmingham . .	2,852	10,497	838	2,094	913	1,922	424	172	489	1,567	161	96
Wolverhampton . .	3,100	12,050	731	2,072	632	1,747	335	325	297	1,188	193	128
Wolstanton . .	2,661	10,025	726	1,936	744	1,777	383	159	361	851	88	99
Manchester . .	3,487	13,539	905	2,009	1,060	1,839	499	170	561	1,945	148	149
Leeds	3,271	12,047	817	1,913	914	1,786	484	127	430	1,418	122	161
Macclesfield . .	2,582	9,036	691	1,544	722	1,390	305	154	417	548	81	117
Leek	2,276	7,266	588	1,157	666	866	159	291	507	392	70	74
FEMALES.												
New Forest . . .	1,764	3,502	521	765	661	657	182	108	479	168	106	105
Towcester . . .	2,390	6,189	573	1,294	602	1,043	123	251	479	288	173	150
Glendale . . .	1,466	3,173	218	166	299	136	70	30	229	60	80	84
Haltwhistle . .	1,727	3,385	399	207	583	89	64	118	519	59	35	0
Easington . . .	1,756	5,513	264	371	357	371	63	0	294	380	61	40
Houghton-le-Spring .	2,025	5,561	394	665	474	655	134	10	340	181	142	31
Redruth . . .	1,947	6,376	450	1,062	479	523	88	539	391	161	95	55
Alston . . .	1,711	3,453	494	324	779	265	245	59	533	28	8	67
Reeth	1,852	3,376	528	558	717	558	325	0	392	83	68	33
Carnarvon . . .	2,210	6,171	547	312	768	142	229	170	539	42	84	62
Liverpool . . .	3,496	13,985	939	2,364	759	2,062	333	302	426	1,582	138	117
Bristol . . .	2,702	8,987	742	1,858	794	1,716	388	142	406	715	163	84
Hull	2,865	9,261	525	1,323	523	1,043	188	179	335	813	106	89
Birmingham . .	2,601	9,304	699	1,913	706	1,715	340	198	366	1,337	180	90
Wolverhampton . .	2,941	10,680	692	2,132	607	1,740	240	392	367	1,024	164	114
Wolstanton . .	2,561	8,804	727	1,757	719	1,564	225	193	494	649	99	85
Manchester . .	3,093	11,833	816	1,695	906	1,520	409	175	497	1,613	142	141
Leeds	2,982	10,930	718	1,843	727	1,726	372	117	355	1,211	118	121
Macclesfield . .	2,544	7,602	804	1,342	870	1,132	282	210	588	557	107	98
Leek	2,298	6,170	705	1,165	748	770	160	395	588	207	115	73

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* This head comprises Diseases of the Respiratory Organs and Phthisis.

† This head comprises Laryngitis, Bronchitis, Pleurisy, Pneumonia, Asthma, and Diseases of the Lungs.

No V.—AVERAGE ANNUAL PROPORTION OF DEATHS in the several under-mentioned DISTRICTS from the several under mentioned CAUSES in Children under Five Years of Age during the Period 1848–54.

Death-rates for Persons under Five Years of Age, Male, per 100,000.				Name of District.	Death-rates for Persons under Five Years of Age, Female, per 100,000.			
All Causes.	Diarrhœa.	Pulmonary Affections.*	Nervous Diseases of Children.†		Nervous Diseases of Children.†	Pulmonary Affections.*	Diarrhœa.	All Causes.
3,740	108	461	1,062	New Forest ‡	795	765	168	3,502
7,134	152	1,558	847	Towcester ‡	845	1,294	288	6,189
3,499	57	259	302	Glendale ‡	257	166	60	3,173
3,704	0	448	561	Haltwhistle ‡	386	207	59	3,385
6,150	425	496	1,418	Easington	1,177	371	380	5,513
6,581	242	832	2,274	Houghton-le-Spring.	1,783	665	181	5,561
6,950	169	1,231	836	Redruth	673	1,062	161	6,376
4,288	29	561	355	Alston ‡	354	324	28	3,453
4,321	82	633	1,458	Reeth ‡	725	558	83	3,376
6,100	28	390	3,886	Carnarvon	3,779	312	42	6,171
14,938	1,793	3,092	3,107	Liverpool	2,514	2,364	1,582	13,985
10,008	890	2,072	1,646	Bristol	1,300	1,858	715	8,987
10,203	839	1,465	2,938	Hull	2,367	1,323	813	9,261
10,497	1,567	2,094	1,493	Birmingham	1,167	1,913	1,337	9,304
12,050	1,188	2,072	2,132	Wolverhampton	1,741	2,132	1,024	10,680
10,025	851	1,936	2,426	Wolstanton	1,936	1,757	649	8,804
13,539	1,945	2,009	3,496	Manchester	2,733	1,695	1,613	11,833
12,047	1,418	1,913	3,301	Leeds	2,752	1,843	1,211	10,930
9,036	548	1,544	2,330	Macclesfield	1,723	1,342	557	7,602
7,266	392	1,157	1,832	Leek	1,362	1,165	207	6,170

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* Pulmonary affections comprise the several causes of death classed by the Registrar-General as diseases of the respiratory organs and phthisis.

† This column is calculated on the presumption that all the deaths from hydrocephalus, convulsions, and teething occur in children under five years of age.

‡ The population in these places is small, and of course the deaths few. The addition or subtraction of a very few deaths would have materially affected the death-rates.

No. VI.—Average Annual Proportion of Deaths per 100,000 Persons from the several under-mentioned Causes in the several under-mentioned Divisions and Registration Districts of England and Wales, during the Period 1848–54.

Proportion of Paupers per 1,000 Persons.	Urban Percentage of Population.	Name of District.	All Causes.[*]	Pulmonary Affections.[a]	Measles.	Scarlatina.	Hooping-cough.	Alvine Flux.[b]	Typhus.	Phthisis.[c]	Nervous Diseases of Children.[d]
—	50	ENGLAND AND WALES	2,200	552	39	90	48	164	99	282	202
—	100	London	2,500	670	45	105	87	280	104	289	174
—	44	South Eastern Counties	2,000	486	20	61	36	122	98	267	142
—	28	South Midland Counties	2,100	481	27	58	37	115	117	263	129
—	31	Eastern Counties	2,000	502	20	75	36	96	99	289	101
—	36	South Western Counties	2,000	483	24	73	39	92	92	246	109
—	51	West Midland Counties	2,200	566	45	87	36	158	99	261	169
—	30	North Midland Counties	2,100	482	32	82	36	84	87	272	240
—	63	North Western Counties	2,700	683	65	133	62	239	107	339	316
—	45	Yorkshire	2,300	529	50	100	43	181	90	277	321
—	44	Northern Counties	2,200	463	40	85	45	182	77	243	189
—	29	Monmouthshire and Wales	2,000	508	25	89	44	112	110	323	252
18	22	Abergavenny	2,500	633	42	105	57	201	209	248	329
44	22	Aberystwith	1,800	458	12	59	96	4	76	374	127
58	11	Alcester	2,100	567	18	24	33	83	76	280	91
44	29	Alston	2,000	687	31	54	35	29	33	358	50
10	74	Aston	2,100	585	49	107	54	217	94	224	157
42	0	Basford	2,100	542	34	73	31	93	92	304	278
61	33	Bedford	2,300	474	21	31	57	96	116	287	111
27	27	Belper	2,100	512	21	65	29	51	90	304	252
49	49	Berkhampstead	2,200	530	70	118	38	139	115	273	151
68	29	Bideford	1,700	383	22	79	28	55	77	173	84
35	100	Birmingham	2,600	768	61	113	62	275	128	297	180
38	58	Blackburn	2,500	721	79	104	65	137	164	381	308
68	0	Blofield	2,000	434	29	76	23	59	94	238	91
27	0	Bootle	1,600	304	5	35	23	14	21	225	49
20	57	Bradford (Yorkshire)	2,500	607	69	119	60	218	93	319	460
†	100	Bristol	2,900	851	40	114	61	281	108	364	166
55	17	Bromsgrove	2,200	571	36	45	32	82	89	291	109
96	0	Builth	1,600	405	2	56	31	8	96	291	70
83	28	Caernarvon	2,000	530	20	118	64	45	115	374	510
28	16	Chesterfield	2,100	478	35	108	52	63	88	292	340
19	84	Chorlton	2,500	685	59	166	89	288	95	327	259
†	100	Coventry	2,700	615	42	117	31	429	135	262	161
92	0	Cranbrook	1,900	417	4	65	38	55	115	260	114

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[a] This head comprises phthisis, laryngitis, bronchitis, pleurisy, pneumonia, asthma, and diseases of the lungs.

[b] Diarrhœa, dysentery, and cholera.

[c] Phthisis only.

[d] Hydrocephalus, convulsions, and teething.

[*] Extracted from the Registrar General's Sixteenth Annual Report, pp. 142–9. The death-rates being calculated by the Registrar General for 1,000 persons, cyphers have been added to bring the rates to the denomination used in this paper.

† No Return.

No. VI.—AVERAGE ANNUAL PROPORTION of DEATHS per 100,000 Persons from the several under-mentioned CAUSES in the several under-mentioned DIVISIONS and REGISTRATION DISTRICTS of ENGLAND and WALES, during the Period 1848–54—*continued.*

Proportion of Paupers per 1,000 Persons.	Urban Per-centage of Population.	Name of District.	ALL CAUSES.*	Pulmonary Affections. *a*	Measles.	Scarlatina.	Hooping-cough.	Alvine Flux. *b*	Typhus.	Phthisis. *c*	Nervous Diseases of Children. *d*
9	93	Derby	2,400	641	44	53	35	112	97	360	315
35	63	Dudley	2,500	541	97	131	52	326	125	165	293
27	0	Easington	2,000	242	69	106	48	267	48	134	206
58	100	East Stonehouse	2,900	719	58	125	69	344	137	307	209
28	92	Ecclesall Bierlow	2,200	652	40	123	48	201	116	305	229
59	29	Farnham	1,800	513	5	43	38	113	81	217	131
59	0	Garstang	1,600	406	16	147	20	42	46	309	90
47	53	Gateshead	2,500	539	43	90	41	344	95	253	284
53	0	Glendale	1,500	216	22	127	22	56	75	144	37
38	100	Gravesend	2,500	595	33	94	48	414	188	276	171
36	28	Halifax	2,200	555	57	93	37	76	73	303	434
26	0	Haltwhistle	1,600	368	8	9	27	17	35	292	64
64	20	Hemel Hempstead	2,000	417	33	38	34	111	130	203	139
40	0	Hendon	1,700	403	16	89	38	146	67	214	101
73	39	Hinckley	2,200	627	33	70	42	69	130	314	222
69	0	Holsworthy	1,600	439	5	78	21	10	51	193	62
83	22	Holywell	2,100	527	21	72	51	66	79	339	308
38	16	Houghton-le-Spring	2,000	378	51	53	25	89	90	184	301
33	25	Huddersfield	2,200	549	83	116	46	97	84	305	292
†	100	Hull	3,100	555	62	93	43	568	119	281	325
63	100	Ipswich	2,300	651	32	58	45	195	89	320	125
43	65	Kidderminster	2,200	560	23	43	11	88	108	284	137
24	30	King's Norton	1,700	489	34	66	23	99	76	199	116
28	33	Knaresborough	2,000	458	20	25	26	103	60	224	234
48	100	Leeds	3,000	766	80	82	60	493	131	289	379
30	38	Leek	2,100	646	35	92	73	77	82	445	210
54	100	Leicester	2,700	697	85	69	58	209	155	390	246
51	26	Leighton-Buzzard	2,100	472	17	74	30	129	204	247	148
68	34	Leominster	2,200	412	9	75	25	37	37	220	123
28	37	Lewes	1,900	490	8	58	27	62	125	309	162
49	13	Liskeard	1,800	461	20	92	49	101	83	229	103
56	100	Liverpool	3,600	999	107	118	94	663	147	407	337
39	56	Luton	2,100	546	40	27	39	116	142	312	148
27	62	Macclesfield	2,600	748	40	98	53	135	101	421	248
43	81	Madeley	2,300	511	45	121	52	48	82	279	262
62	57	Maidstone	2,300	571	28	68	42	224	83	289	185
49	93	Manchester	3,300	859	80	143	92	364	145	385	390
102	69	Melksham	2,200	605	14	44	31	86	146	232	149
45	80	Merthyr-Tydfil	2,800	657	57	121	49	519	207	409	424
71	98	Newcastle-on-Tyne	2,700	641	52	77	82	419	108	297	312
73	0	New Forest	1,700	473	19	51	18	57	95	280	127

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a This head comprises phthisis, laryngitis, bronchitis, pleurisy, pneumonia, asthma, and diseases of the lungs.

b Diarrhœa, dysentery, and cholera.

c Phthisis only.

d Hydrocephalus, convulsions, and teething.

* Extracted from the Registrar General's Sixteenth Annual Report, pp. 142–9. The death-rates being calculated by the Registrar General for 1,000 persons, cyphers have been added to bring the rates to the denomination used in this paper.

† No Return.

No. VI.—AVERAGE ANNUAL PROPORTION of DEATHS per 100,000 Persons, from the several under-mentioned CAUSES in the several under-mentioned DIVISIONS and REGISTRATION DISTRICTS of ENGLAND and WALES, during the Period 1848–54—*continued.*

Proportion of Paupers per 1,000 Persons.	Urban Percentage of Population.	Name of District.	ALL CAUSES.*	Pulmonary Affections. *a*	Measles.	Scarlatina.	Hooping-cough.	Alvine Flux. *b*	Typhus.	Phthisis. *c*	Nervous Diseases of Children. *d*
88	14	Newport Pagnell . .	2,200	488	28	61	36	66	90	288	122
39	79	Northampton . . .	2,400	549	56	85	42	202	142	313	203
56	25	North Witchford . .	2,700	504	35	51	29	165	109	277	102
†	100	Norwich	2,400	536	40	139	48	208	90	273	161
47	98	Nottingham . . .	2,600	753	70	66	61	208	110	338	278
58	0	Pateley Bridge . . .	1,900	450	21	44	28	50	107	330	227
21	29	Penzance	2,000	505	41	70	52	128	65	327	73
†	100	Plymouth	2,500	610	59	125	72	396	142	233	157
71	100	Portsea Isle . . .	2,500	617	34	77	41	251	139	285	209
55	75	Preston	2,500	772	74	99	59	205	102	374	292
25	0	Radford	2,200	668	36	91	42	164	108	330	296
40	25	Redruth	2,000	555	55	57	75	83	74	382	102
54	0	Reeth	2,000	626	14	42	27	40	44	218	165
44	29	Richmond (Yorkshire)	1,800	426	6	55	28	64	36	205	129
34	40	Rochdale	2,400	609	78	94	43	110	102	345	336
57	0	Romney Marsh . .	1,900	352	3	42	44	55	89	183	171
103	28	Saffron Walden . . .	2,100	566	27	65	38	49	117	309	122
32	97	Salford	2,800	734	79	147	86	341	90	301	335
36	76	Sculcoates	2,500	427	52	85	40	463	109	210	312
39	97	Sheffield	2,700	754	75	111	78	269	149	341	350
50	36	Spalding	2,200	477	34	86	44	87	88	197	192
29	52	Stafford	2,200	565	44	70	27	69	101	305	125
†	100	Stoke Damerel . . .	2,600	605	87	127	67	363	136	267	161
25	95	Stoke-upon-Trent . .	2,700	692	71	168	47	151	95	352	328
62	23	Stroud	2,100	510	24	84	31	78	91	248	101
51	67	Swansea	1,900	591	13	43	52	128	127	306	227
67	19	Towcester	2,200	525	25	50	38	168	146	293	108
49	45	Tynemouth . . .	2,400	506	32	97	40	327	82	229	193
38	21	Ulverstone . . .	1,800	441	14	141	38	58	74	256	109
44	0	Weardale	2,000	515	26	49	35	63	76	273	125
71	24	Wellingborough . .	2,200	491	60	98	57	66	142	318	161
35	76	West Derby . . .	2,600	678	68	157	67	302	95	328	263
57	71	Whittlesey . . .	2,500	458	63	109	78	173	136	273	174
50	50	Wigan	2,800	621	76	151	63	352	133	302	395
78	35	Wisbeach	2,500	494	53	108	76	221	128	248	216
35	68	Wolstanton . . .	2,600	726	41	115	27	188	93	315	309
24	86	Wolverhampton . .	2,700	712	109	108	56	402	151	263	275
47	99	Worcester	2,400	596	24	90	30	135	72	319	131
49	16	Wrexham	2,300	553	31	119	22	58	119	280	371
82	30	Wycombe	2,100	496	36	43	38	130	126	277	88
69	28	Yeovil	2,100	563	21	67	39	40	94	285	105

a This head comprises phthisis, laryngitis, bronchitis, pleurisy, pneumonia, asthma, and diseases of the lungs.
b Diarrhœa, dysentery, and cholera. *c* Phthisis only. *d* Hydrocephalus, convulsions, and teething.
* Extracted from the Registrar General's Sixteenth Annual Report, pp. 142–9. The death-rates being calculated by the Registrar General for 1,000 persons, cyphers have been added to bring the rates to the denomination used in this paper. † No Return.

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